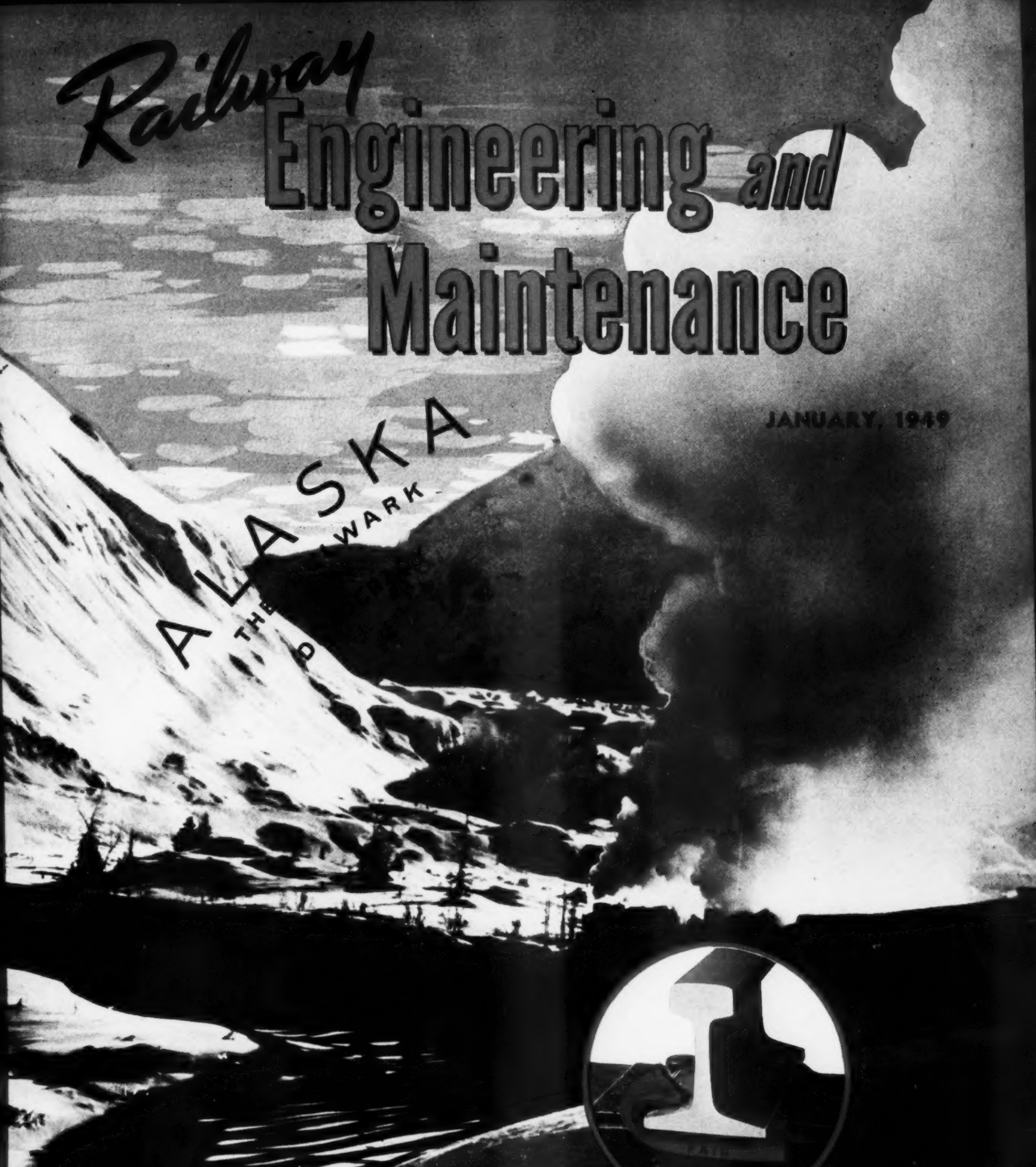
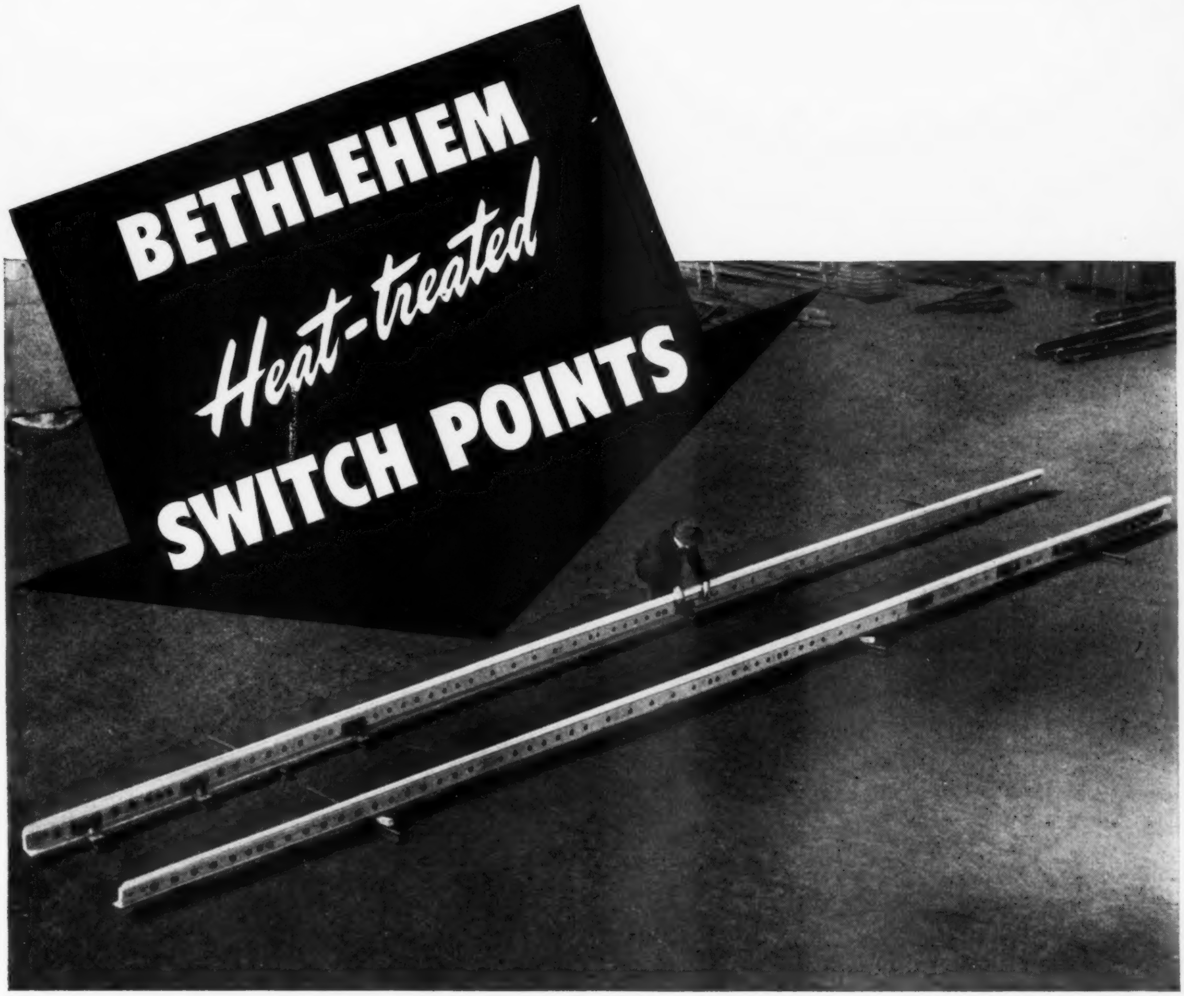
Railway Engineering and Maintenance

JANUARY, 1949





...any length to 45 feet

Exceptional facilities are required for the making and heat-treating of 45-ft switch points, and Bethlehem is well-equipped for this work. At Bethlehem's track shops, long points like those shown above are handled with complete ease in equipment specially designed for the purpose.

It goes without saying that full facilities exist for the production and treatment of smaller units. We make them in all standard sizes; give us your specifications and we'll do the rest.

Over a period of years, Bethlehem has developed the heat-treating of switch points to a high degree of perfection. The methods and equipment used were evolved only after exhaustive studies of rail-steel chemistry and the requirements of the track structure.

Every step of the way, your Bethlehem-built switch points are expertly made. They are subject throughout to precise metallurgical controls. Like all Bethlehem trackwork, they can be purchased and installed with confidence.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
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★ BETHLEHEM STEEL ★

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

"SOFT TRACK" can be stabilized quickly, lastingly, at low cost

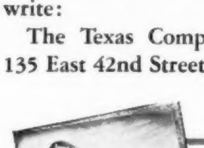
Leading railroads have proved results with the Texaco method of asphalt-cement pressure grouting

Asphalt-cement pressure grouting is the way to get rid of "water pockets" for good. Just be sure you use asphalt made especially for this purpose — *Texaco No. 24 Emulsified Asphalt.* A small amount of this superior asphalt assures outstanding results.

Texaco No. 24 Emulsified Asphalt acts as a "lubricant" for the grout — encourages it to flow more easily, penetrate and seal better. Pure asphalt, released as the grout sets, provides excellent waterproofing for the soil and keeps the soil resilient and stable.

Lasting effectiveness . . . low first cost . . . remarkable savings in subsequent maintenance . . . the story of these *benefits actually achieved* is told in the book illustrated. Send for your copy today. Call the nearest Railway Sales Division office listed below, or write:

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.



SEND FOR this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, and benefits secured by a leading railroad.

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FOR GROUTING

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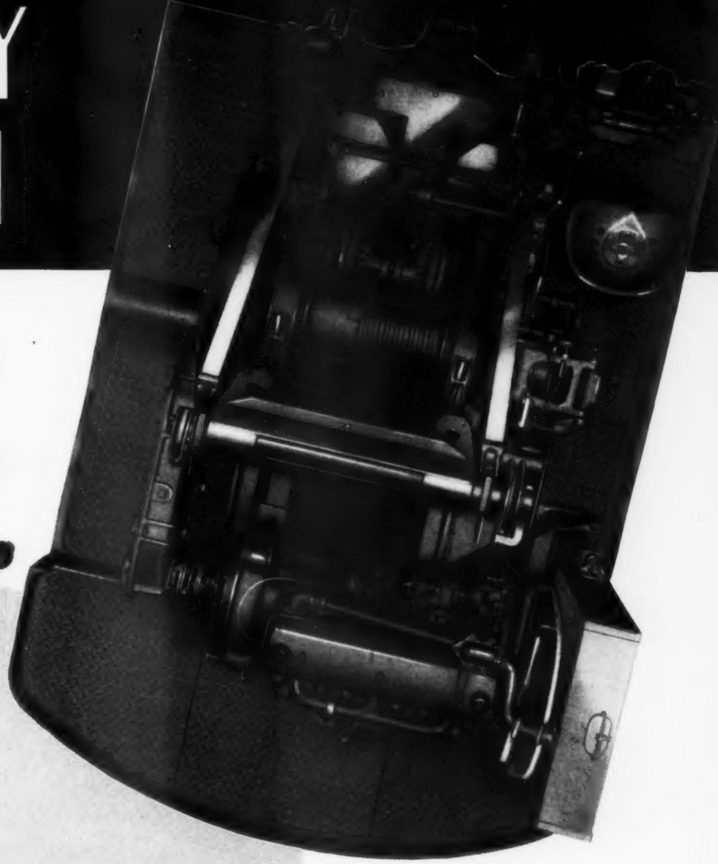

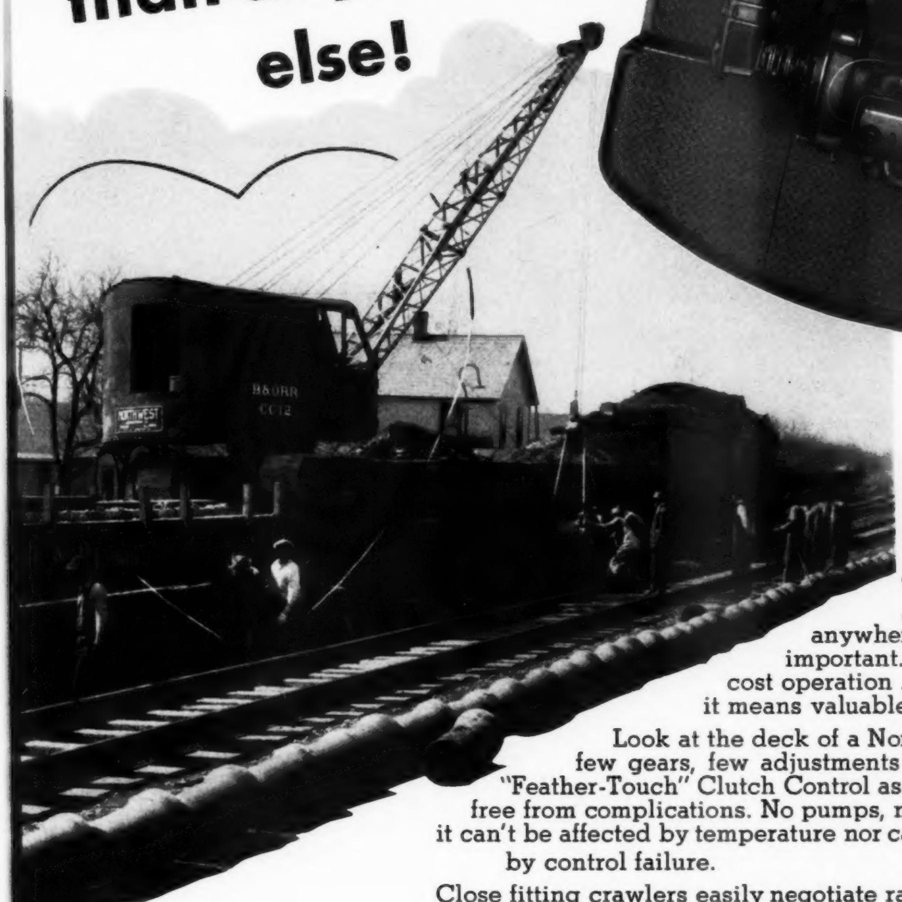
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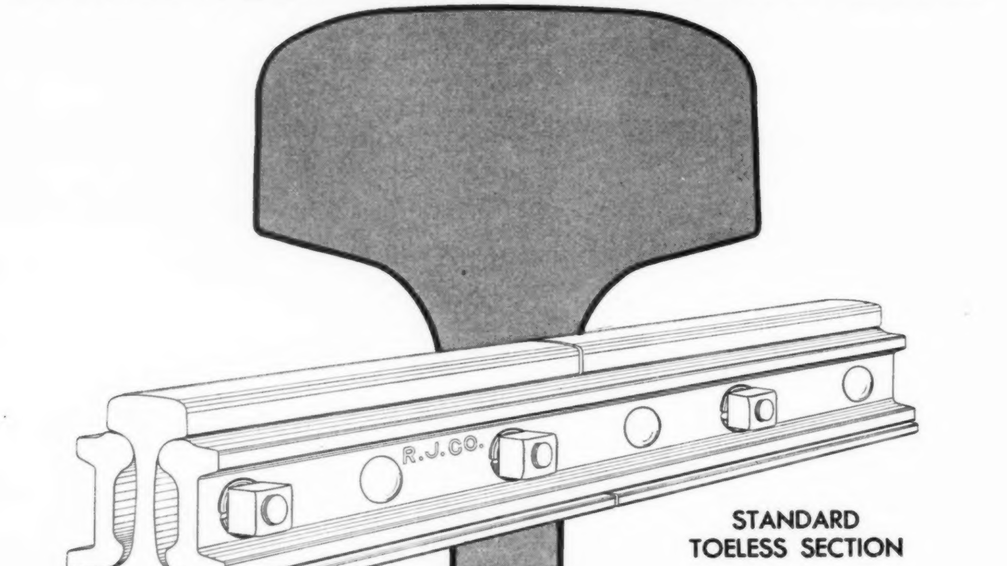
RAIL JOINTS

INSURES LONGER RAIL LIFE



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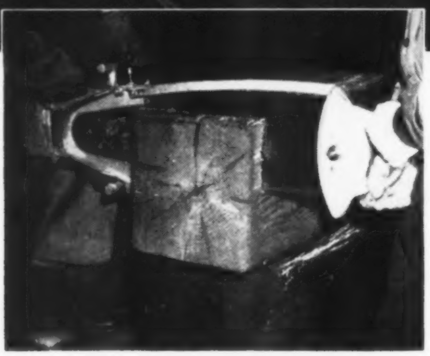
But Look at the Performance You Get



When very accurate cuts are necessary a helper's handle is easily attached to insure precise cuts at any angle.

Here, for the first time, is a small saw that does the work of a big saw . . . a modern, high cycle electric chain saw that can be handled by one man with complete ease. Extremely fast and efficient, this saw cuts heavy timber and trees up to 36″ diameter in amazingly low time. And because of its light weight . . . only 27 lbs. complete . . . it is easily operated no matter where your cutting is necessary.

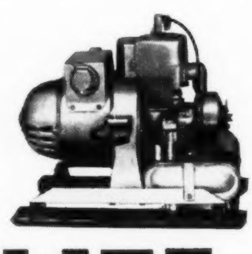
Another important point, with a Homelite Chain Saw you get *electric* chain saw efficiency everywhere . . . even in remote locations . . . for you operate your Homelite Chain Saw with a Homelite Dual Purpose Generator, a *carryable* generator that can be picked up and easily transported to any job at any location.

Small, compact and easily handled, the Homelite Chain Saw gets in and cuts where larger saws are unworkable.

Your Power Unit For a Plus Performance

A Homelite Dual Purpose Generator is really a *multi-purpose* generator. You can use it not only for your Homelite Chain Saw but for operating both high cycle and standard universal 110 volt tools plus floodlights on emergency night work.

See how this is done. Write, today, for our new Homelite Chain Saw bulletin.



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MANUFACTURERS OF HOMELITE CARRYABLE PUMPS • GENERATORS • BLOWERS • CHAIN SAWS

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LORAIN TL-20 MOTO-CRANE MOBILITY KEEPS SCHEDULED R.R. MAINTENANCE JOBS "ON TIME"

THEW-LORAIN 1899 50th 1949 ANNIVERSARY

MAINTENANCE and construction jobs are always held to a tight schedule on America's railroads.

For fast, efficient handling of materials is assured with "drop shipments" at any point desired along the right-of-way through the medium of a Lorain TL-20 Moto-Crane . . . another example of mechanizing materials handling operations by railroads everywhere in their effort to level off rising maintenance costs.

Whether it's new construction, maintenance-of-way or yard work, there's a Lorain TL-20 to fit your job requirements. All units feature complete interchangeability of boom equipment and are available with either 2-speed chain crawler or 9 types of rubber-tire mountings. No other machine in its class can match the Lorain TL-20 for sheer brute power, speed and day-in-day-out dependability.

Get the "inside story" on these better built units from your Thew-Lorain distributor—today.

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THE THEW SHOVEL COMPANY
LORAIN, OHIO

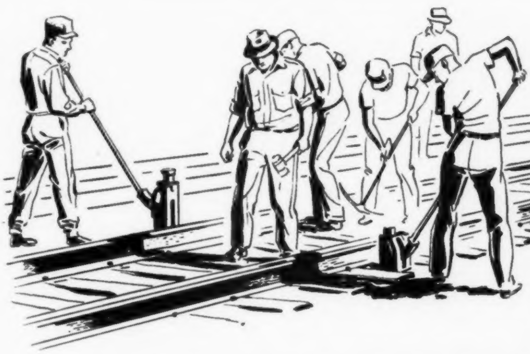
CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

For **QUICK . . .**

POSITIVE . . .

SMOOTH OPERATING ACTION . . .

LESS JACKING EFFORT . . .



No. 117 Track Jack

DUFF-NORTON

TRACK JACKS

Best for Track Maintenance, Surfacing, Lining

No. 517 Surfacing Jack

The consistent safety . . . dependability . . . economy and easy operating action of Duff-Norton Jacks . . . through years of heavy duty railroad service . . . are the reasons why these sturdy jacks have reached such popularity for track maintenance, surfacing and lining. Less jacking effort is required to raise rails, rapid tripping action lowers rails quickly. These features are extremely important in speeding up work, and in providing maximum safety for section gangs and rolling stock. Write for Catalog 203.

QUICK DATA ON TRACK JACKS!

Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Head Inches	Foot Lift Ht. Inches	Weight Pounds
117	15	22	13	6½ x 11	3 x 3	2	60
117A	15	22	13	6½ x 11	3 x 3	2	42
217	15	16½	7½	6½ x 11	3 x 3	2	52
617	15	28	18½	7 x 12	3 x 3	2	75
517	15	11	5	6½ x 10¼	3 x 3	2	40

DUFF-NORTON JACKS ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA. CANADIAN PLANT, TORONTO, ONT.

"The House that Jacks Built"

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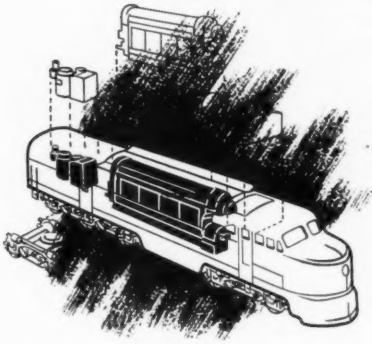
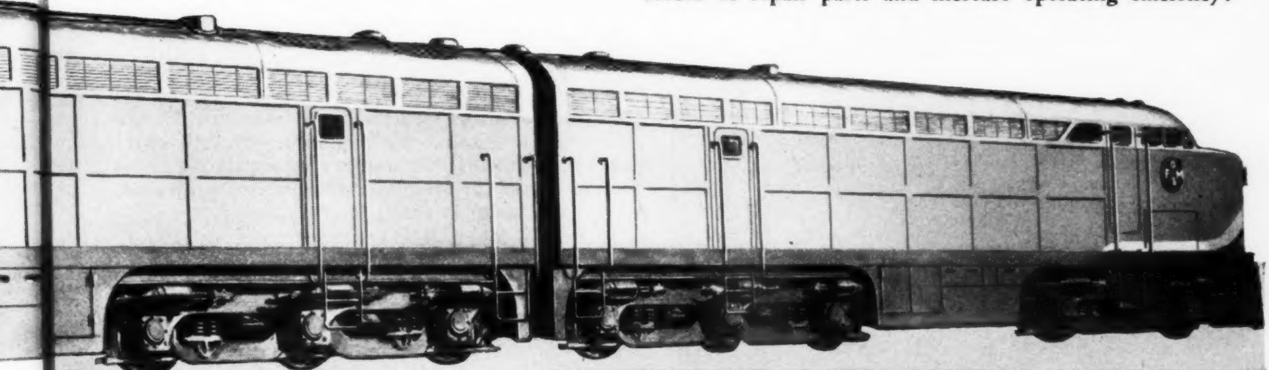
Unlimited Advantages in Maintenance, Operation and Selection



The "C" Line Introduces UNITIZED DESIGN

For the first time, in the "C" Line locomotive, sub-assembly construction has been generously employed. Simple, standard "packaged" units—dynamic braking, compressor, engine, oil filter, cooler, boiler, water tanks—are assembled on the production floor and installed in the body by connecting pre-set wires, piping, fuel and water lines, etc. All units are interchangeable with similar units.

Think what this can do to reduce maintenance, simplify stocks of repair parts and increase operating efficiency!



Ten Point Superiority . . .

1. *Less Total Weight*
2. *More Weight on Drivers*
3. *Uniform Wheel Loading*
4. *Horsepower to Suit the Job*
5. *Shorter Overall Length*
6. *Excellent Continuous Tractive Effort*
7. *Good Tracking and Riding Qualities*
8. *Dynamic Braking on Any Model*
9. *Maximum Interchangeability of Parts*
10. *Maximum Accessibility*

To Railroad Executives . . .

Fairbanks, Morse & Co. invites your questions in regard to the application of "C" Line locomotives to your railroad. Complete details are available on request.

Unlimited Combinations from one Basic Unit

HORSE-POWER	TYPE	LENGTH: 56'-3 (P. F.) HEIGHT: 15'-0 MAX	TOTAL WEIGHT (TONS)	WEIGHT ON DRIVERS (TONS)	WEIGHT PER IN. OF WHEEL	CONTINUOUS T. E. IN THOUSANDS LBS 65 M.P.H.	100 M.P.H.	WATER CAP. GAL.	FUEL CAP. GAL.	DYN. BRAKE
1600	A		120	120	714 lbs.	42.8 @ 11.2 mhp	26.4 @ 18.7 mph	0	1200	Yes
	B		120	120	714 lbs.	42.8 @ 11.2 mph	26.4 @ 18.7 mph	0	1200	Yes
2000	A		123	123	732 lbs.	42.8 @ 14.7 mph	26.4 @ 23.5 mph	0	1200	Yes
	B		123	123	732 lbs.	42.8 @ 14.7 mph	26.4 @ 23.5 mph	0	1200	Yes
2400	A		126	126	750 lbs.	42.8 @ 17.7 mph	26.4 @ 28.2 mph	0	1200	Yes
	B		126	126	750 lbs.	42.8 @ 17.7 mph	26.4 @ 28.2 mph	0	1200	Yes
1600	A		125	125	744 lbs.	42.8 @ 11.2 mph	26.4 @ 18.7 mph	1000	1200	Yes
	B		125	125	744 lbs.	42.8 @ 11.2 mph	26.4 @ 18.7 mph	1000	1200	Yes
1600	A		134	110	655 lbs.	42.8 @ 11.2 mph	26.4 @ 18.7 mph	1400 3000 #/hr Boiler	1200	Yes
	B		134	110	655 lbs.	42.8 @ 11.2 mph	26.4 @ 18.7 mph	1400 3000 #/hr Boiler	1200	Yes
2000	A		139	114	678 lbs.	42.8 @ 14.7 mph	26.4 @ 23.5 mph	1400 3000 #/hr Boiler	1200	Yes
	B		139	114	678 lbs.	42.8 @ 14.7 mph	26.4 @ 23.5 mph	1400 3000 #/hr Boiler	1200	Yes
2400	A		142	116	690 lbs.	42.8 @ 17.7 mph	26.4 @ 28.2 mph	1400 3000 #/hr Boiler	1200	Yes
	B		142	116	690 lbs.	42.8 @ 17.7 mph	26.4 @ 28.2 mph	1400 3000 #/hr Boiler	1200	Yes

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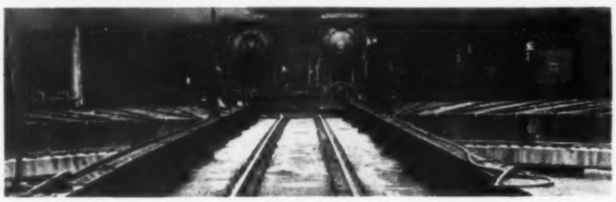
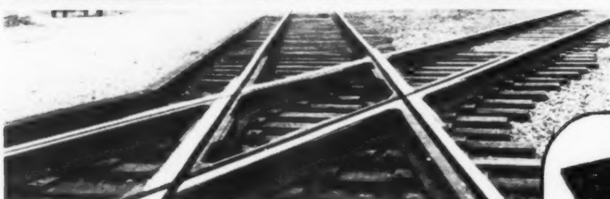
FABREEKA

ABSORBS IMPACT SHOCK AND VIBRATION ON BRIDGES, CURVES, SWITCHES, AND TURNTABLES

The physical properties of Fabreeka, — great strength; minimum permanent set; controlled resiliency; high damping value and long life make Fabreeka the ideal material for use beneath crossings, cross-overs, and switches; on curves; in turn-tables; and on steel and concrete deck bridges.





At *crossings, cross-overs,* and *switches* Fabreeka pads between ties and tie plates increase the life of manganese points by cushioning impact blows from the wheels. Fabreeka's slow recoil from "compression" insures cushioning without bounce. Mechanical wear of ties is also reduced.

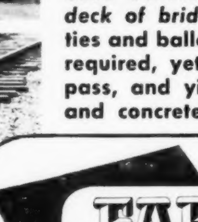
On *curves,* the mechanical wear on ties from plate cutting is eliminated. The frequency and expense of regauging track is greatly reduced. Fabreeka pads keep spikes from lifting.

In *turntables,* Fabreeka reduces impacts through application under end tie plates; under end tie plates of approach tracks; over bearings of turn-table trucks; and under tie plates of circular rail.

Used between the rail and the steel or concrete deck of bridges, Fabreeka eliminates the use of ties and ballast. This reduces the foundation depth required, yet leaves proper clearance for under-pass, and yields sizeable savings in excavating and concrete work.

FABCO TIE PADS

For Open Track



Fabco Tie Pads reduce the mechanical wear of ties, and are especially recommended for use on ties in curves, bridges, and switches where tie life is relatively short and the cost of renewal, high. Withstand extreme temperatures, moisture, mildew, sand. Spikes do not have to be driven down a second and third time.

Longer Tie Life with Fabco Tie Pads
- resilient
- no set — no loose spikes
- no renewals required

Made By The Makers of Fabreeka

FABREEKA PRODUCTS COMPANY, INC.
222M SUMMER STREET
BOSTON 10, MASSACHUSETTS

IT PAYS

to Specify Fabreeka

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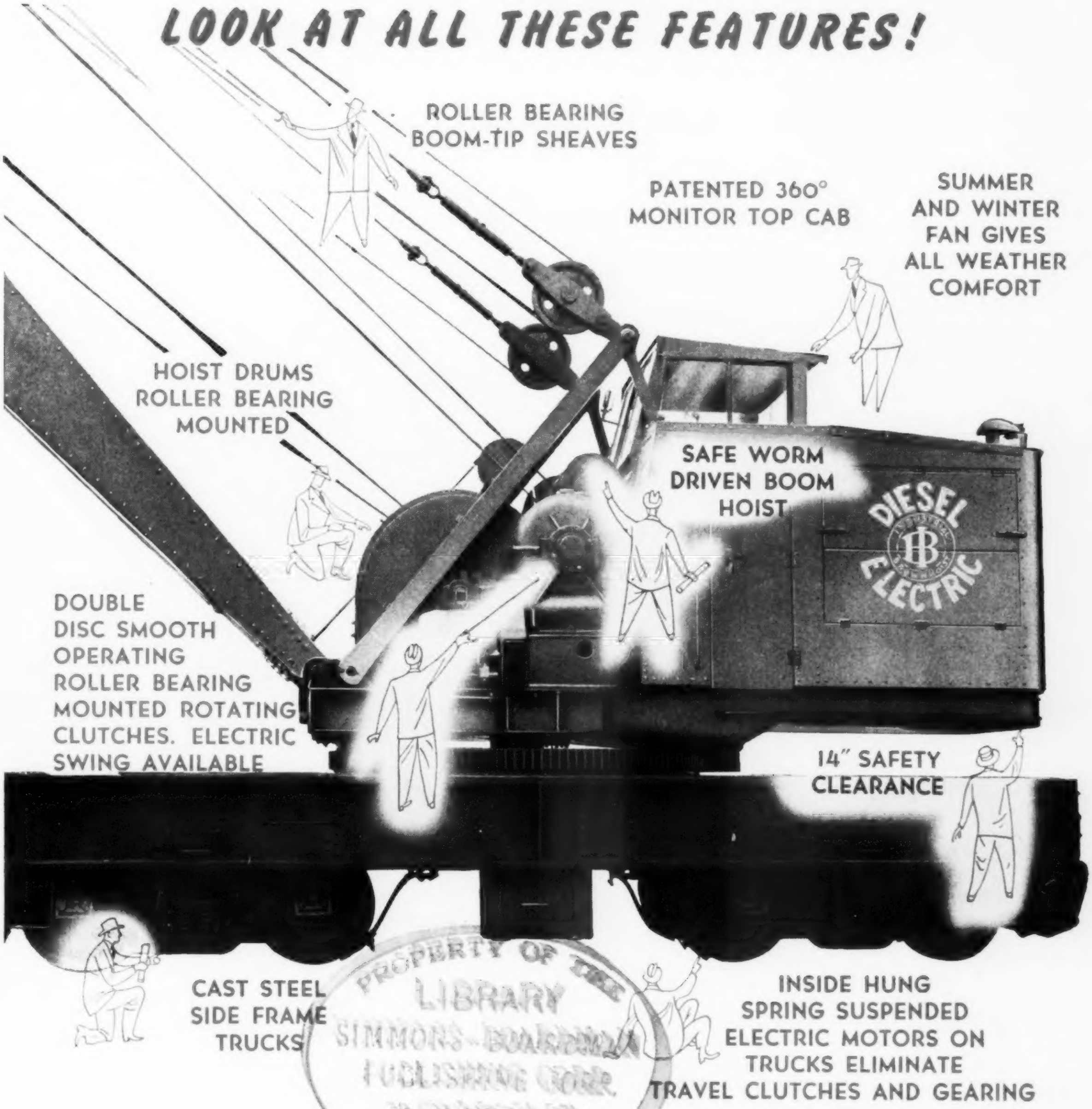
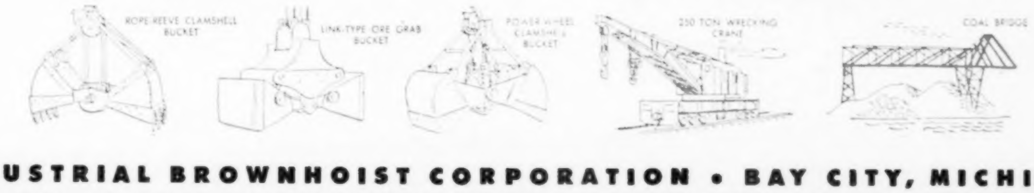
BROWNHOIST DIESEL ELECTRIC LOCOMOTIVE CRANES...30 • 35-40 • 40-50 TON CAPACITIES

PATENT APPLIED FOR

LOOK AT ALL THESE FEATURES!



BROWNHOIST BUILDS BETTER CRANES



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DISTRICT OFFICES NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE, VANCOUVER, B. C., WINNIPEG, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC

How to save 50% on

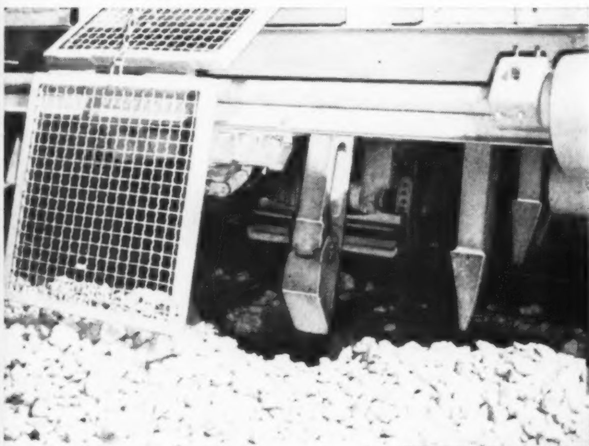
USE MACHINE POWER

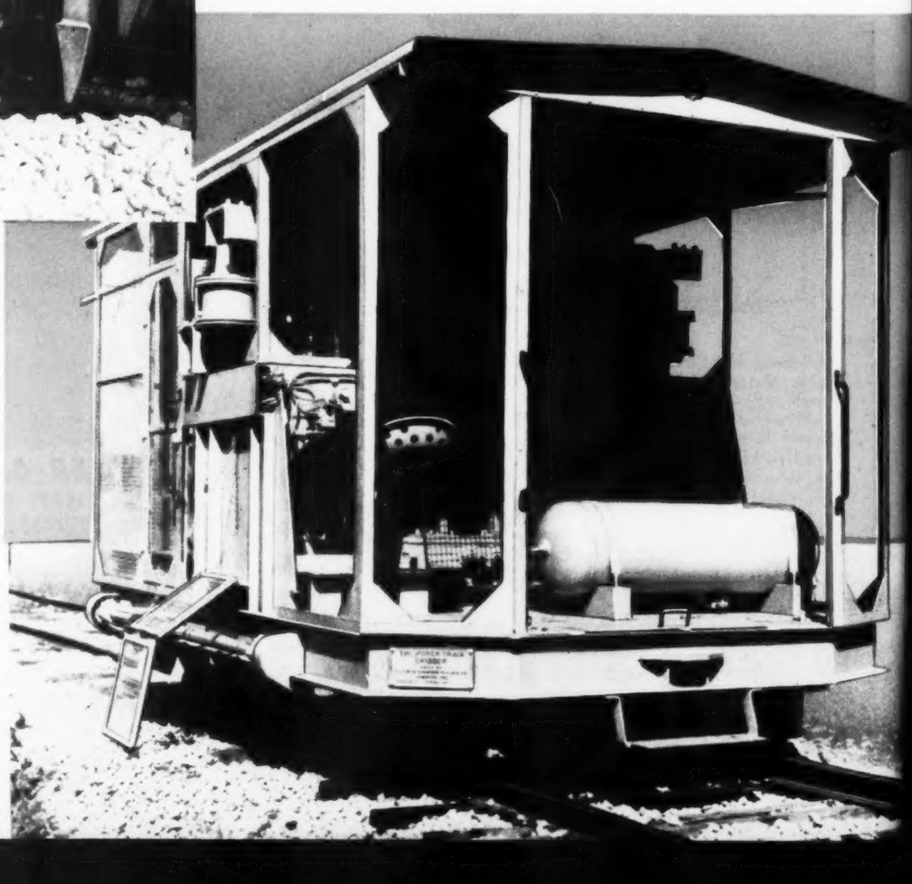
Mechanized track maintenance is recognized as "the fastest moving trend in railroading today." These powerful track cribbers and ballasters are in the forefront of that trend.

This revolutionary power cribber does the work of large crews with hand tools, in removing fouled and compacted ballast from between the ties preparatory to resurfacing the track. It cleans out each crib uniformly, at a rate far beyond that possible with any previous means, at any comparable cost. It operates effectively in all types of ballast, in all track conditions, day or night. Four lateral wheels permit removal from track under its own power in less than five minutes.

Write for analysis comparing cost with gang operations under varied track, ballast, and traffic conditions.

PULLMAN-STANDARD POWER TRACK CRIBBER





PULLMAN-STANDARD POWER TRACK CRIBBER IN POSITION ON TRACK

Close-up shows digger bars, with "impact" bars preparing the crib ahead. Diggers contact the ballast serially, moving the ballast progressively from track center to ends of crib. Depth of digging may be varied for different track conditions and heights of rail.

n Roadbed Maintenance Costs

R TO SAVE MAN POWER!

Like the cribber, this power ballaster greatly increases the production of maintenance gangs. Its output of uniformly ballasted track is faster, better, and cheaper than that of previous methods of track improvement. Performance is uniform, regardless of track raise or ballast conditions. In one on-line experience, for example, results over an extended period showed that this machine enabled one gang (enlarged by only 50%) to *triple* its daily production, cutting maintenance costs *in half*. Other tests under all conditions have produced similar benefits. These figures also are available for your study. Write for them, today.

PULLMAN-STANDARD POWER BALLASTER

Pullman-Standard

CAR MANUFACTURING COMPANY

Power Ballaster Division

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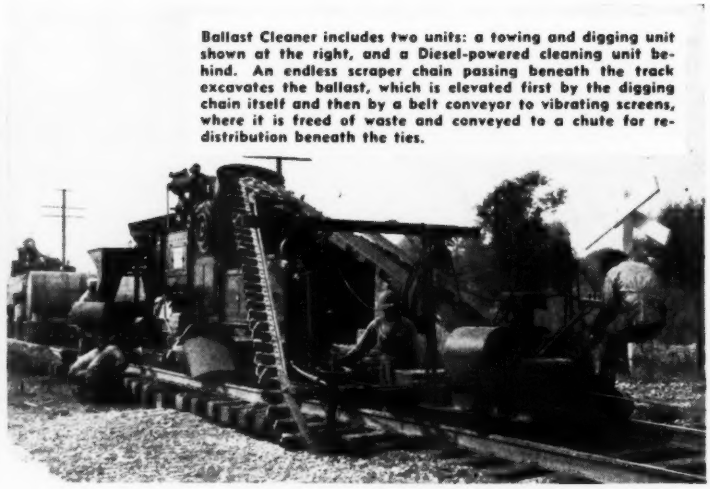
WORCESTER, MASS. • *SAN FRANCISCO SALES REPRESENTATIVE: MARK NOBLE*

PULLMAN-STANDARD POWER BALLASTER ON TRACK

The detail view shows tamping shoes at low position along the tie base. Ballast feed shoes are in extended position; these work the loose ballast back into position between the ties. Like the cribber, this power ballaster can be removed from the track under its own power in less than five minutes.

Rear end of cleaning unit, showing disposal conveyor above, ejecting waste to the side, and delivery conveyor below distributing cleaned ballast.



Ballast Cleaner includes two units: a towing and digging unit shown at the right, and a Diesel-powered cleaning unit behind. An endless scraper chain passing beneath the track excavates the ballast, which is elevated first by the digging chain itself and then by a belt conveyor to vibrating screens, where it is freed of waste and conveyed to a chute for redistribution beneath the ties.

2 *new machines*

The Matisa Automatic Ballast Cleaner and the Matisa Automatic Tie Tamper, both developed in Switzerland and experienced in track maintenance service in England, France, and Belgium in the past 12 years, are now available to American railroads.

Both are self-propelled on-track machines. Output for the Ballast Cleaner is 150 to 240 lineal feet of track per hour of actual uninterrupted operation, depending on ballast conditions. The Tie Tamper, requiring only one man to operate, will tamp 400 to 600 feet of track per hour under normal conditions.

Full details and work records on request.

Also: Universal Bolt and Tie Screw Driving Machines, Rail Drilling Machines, Tie Drilling Machines, Pulsators, Motor Rail Trucks

Front view of the power tamper

The MATISA EQUIPMENT CORPORATION
206 S. Michigan Ave., Chicago 4, Ill.

EQUIPMENT COMPANY
58 Victoria St., London S.W.1, England

MATERIEL INDUSTRIEL, S.A.
2 Grand Pont, Lausanne, Switzerland
30 Rue de Mogador, Paris, France

MATERIAIS INDUSTRIAIS, S.A.
277 Av. Rio Branco,
Rio de Janeiro, Brazil

Opposed pairs of tamping tools work from each side of a tie, vibrating rapidly while being forced toward each other until desired compactness of ballast under tie is attained.
Two complete tamping mechanisms (one on each side), each comprising 8 tamping tools working in pairs, 4 inside and 4 outside of rail, are raised and lowered by means of compressed air. They are mounted on the Tie Tamper, which is powered and propelled by a combustion engine

Another Milestone in the service life of these cross ties

Unretouched photo of Red Oak Ties after 5 years service—Note absence of checks and splits

*Process Pat'd

T-C Vapor-Drying Process

The Vapor-Drying equipment can be readily installed in most creosoting plants.

Processing licenses are available to treating plants in the railroad and wood preserving industries.

TAYLOR-COLQUITT CO., SPARTANBURG, S. C.

Compression Rail Anchors

The one sure way to eliminate two-way creepage is to anchor in both directions. That's the steady, dependable protection you get with Compression two-way holding. For better, more economical track on main line traffic, turnouts, bridges and crossings.

THE RAILS COMPANY

General Office
178 GOFFE STREET, NEW HAVEN 11, CONN.

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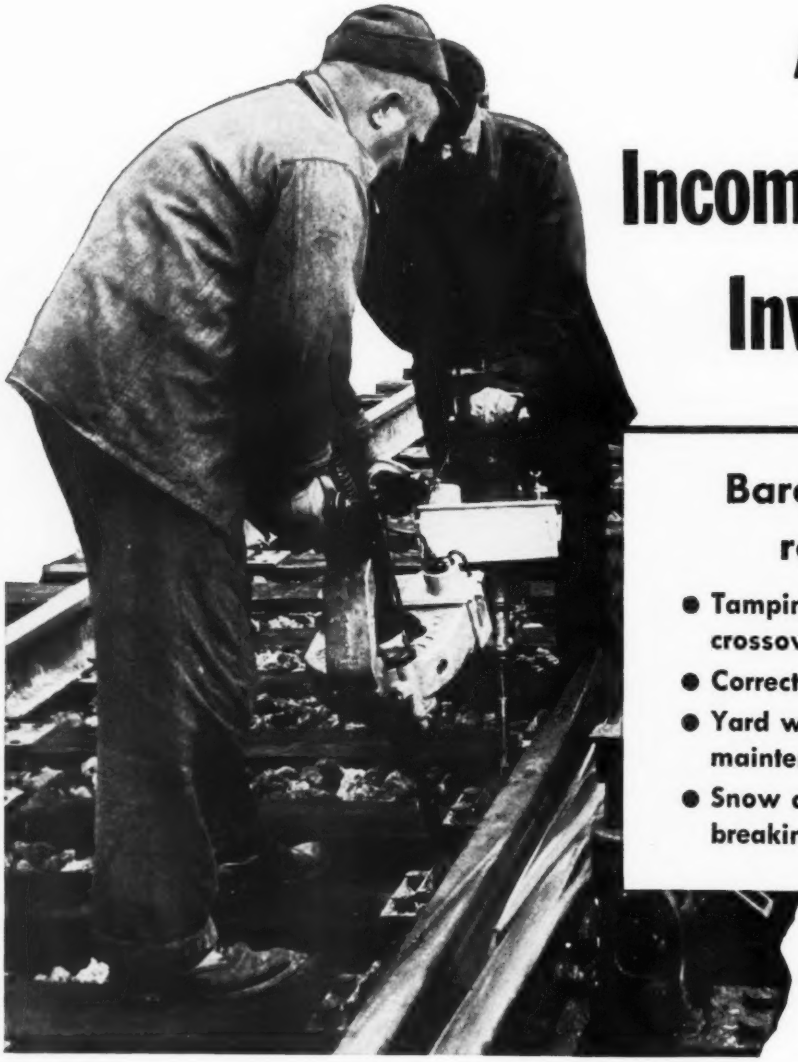
TWO BARCO TYTAMPERS PER SECTION

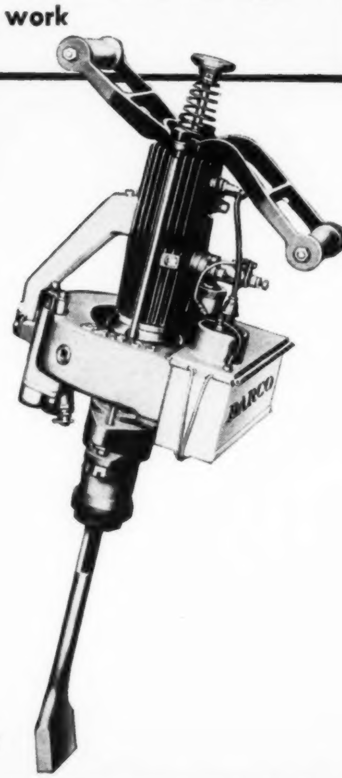
ARE AN

Income-Producing Investment



Barco does a wide range of jobs

- Tamping interlocking switches, crossovers
- Correcting low spots
- Yard work and miscellaneous maintenance
- Snow and ice removal and light breaking work



Armed with 2 Barco Tytampers, a section gang can eliminate frequent resurfacing of track and provide much easier riding for passengers, reduce wear and tear on equipment. Over 100 American railroads prefer Barco because they want *income-producing* equipment that gives maximum maintenance at lowest cost. Light in weight and correctly balanced, Barco is self-contained, provides easy portability on busy right-of-ways, is the only tamper that tamps cemented ballast. For detailed information, write Barco Manufacturing Company, 1805 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Company, Ltd., Montreal, Canada.

BARCO

UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

★ How Sperry Research Contributes to Railroad Safety

"The World's Worst Railroad"

IS DEDICATED TO GREATER RAIL SAFETY

Five hundred yards of typically defective rail runs close to the Sperry plant. It is the Sperry Rail Service research track, and is laid with defective rails selected from the hundreds of thousands of miles of track tested by Sperry Detector Cars.

Every type of rail defect, big and small, is represented...transverse defects...engine burn fractures...vertical and horizontal split heads ...shelly rail and flowed rail.

On this, the "world's worst railroad," new operators of Sperry Detector Cars are trained... equipment is checked and rechecked for accuracy. The perfect combination of highly skilled technicians and sensitive equipment is achieved.

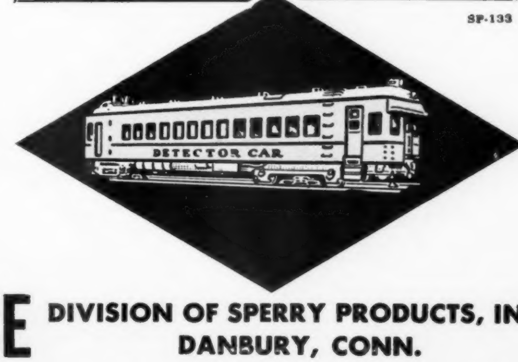
This is but one aspect of Sperry's research, dedicated to helping America's progressive railroads achieve the best in rail safety through the best in rail testing.

REMEMBER

Only Sperry consistently detects small transverse defects.

Only Sperry consistently detects longitudinal defects.

SP-133



SPERRY RAIL SERVICE

DIVISION OF SPERRY PRODUCTS, INC.
DANBURY, CONN.

Talk about strength—ARMCO Liner Plates really have it. The tough, sinewy kind that is not burdened with excess weight.

One glance at an ARMCO Liner Section will show you why. See those deep corrugations and flanges. They are designed to provide safe strength without excess weight or bulk. This is why ARMCO Liner Plates cost less to carry a given load than any other type.

High strength-to-weight ratio also means that ARMCO Liner Plates are easy to handle and install. One man can carry, hold and bolt a section into place with simple hand wrenches. Less bulk also means less excavation. Jobs go fast—labor costs are low.

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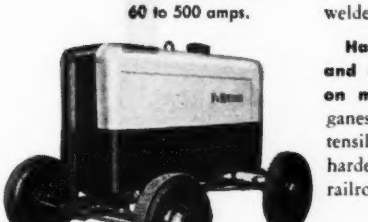

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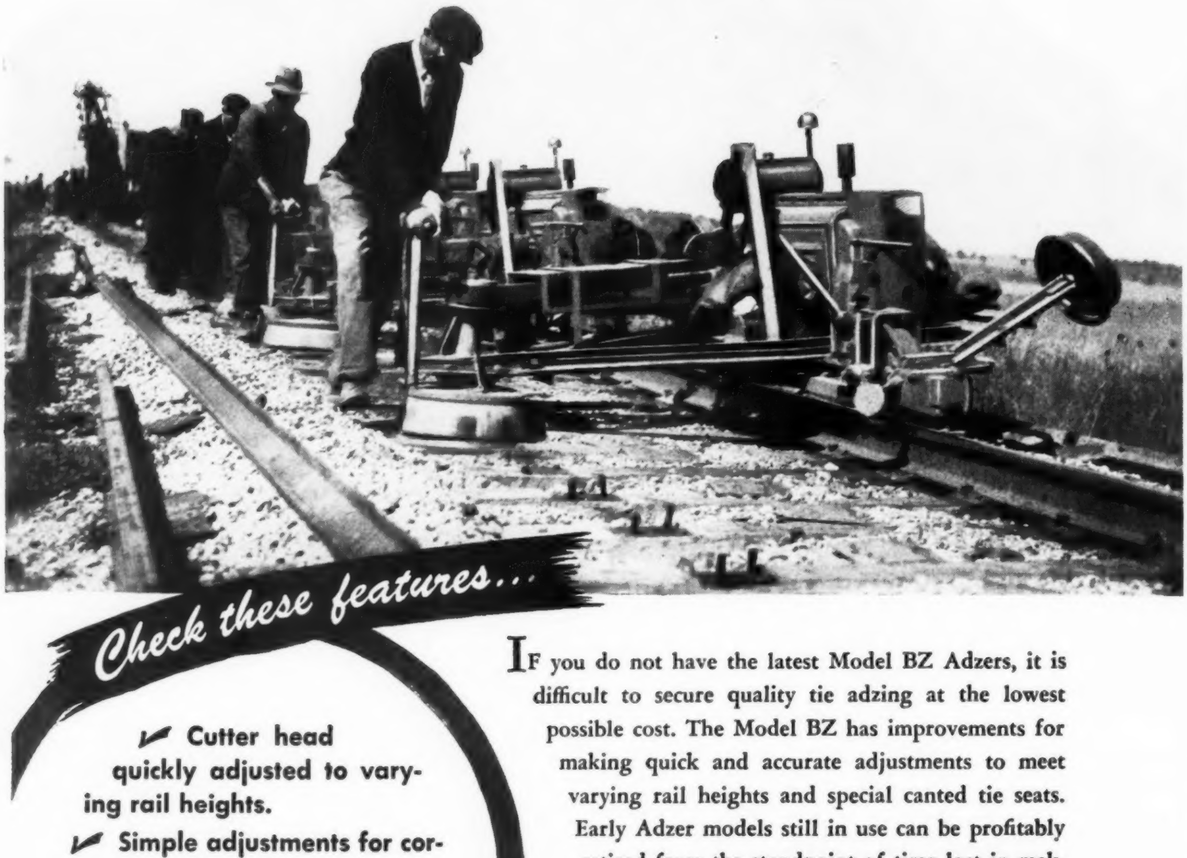

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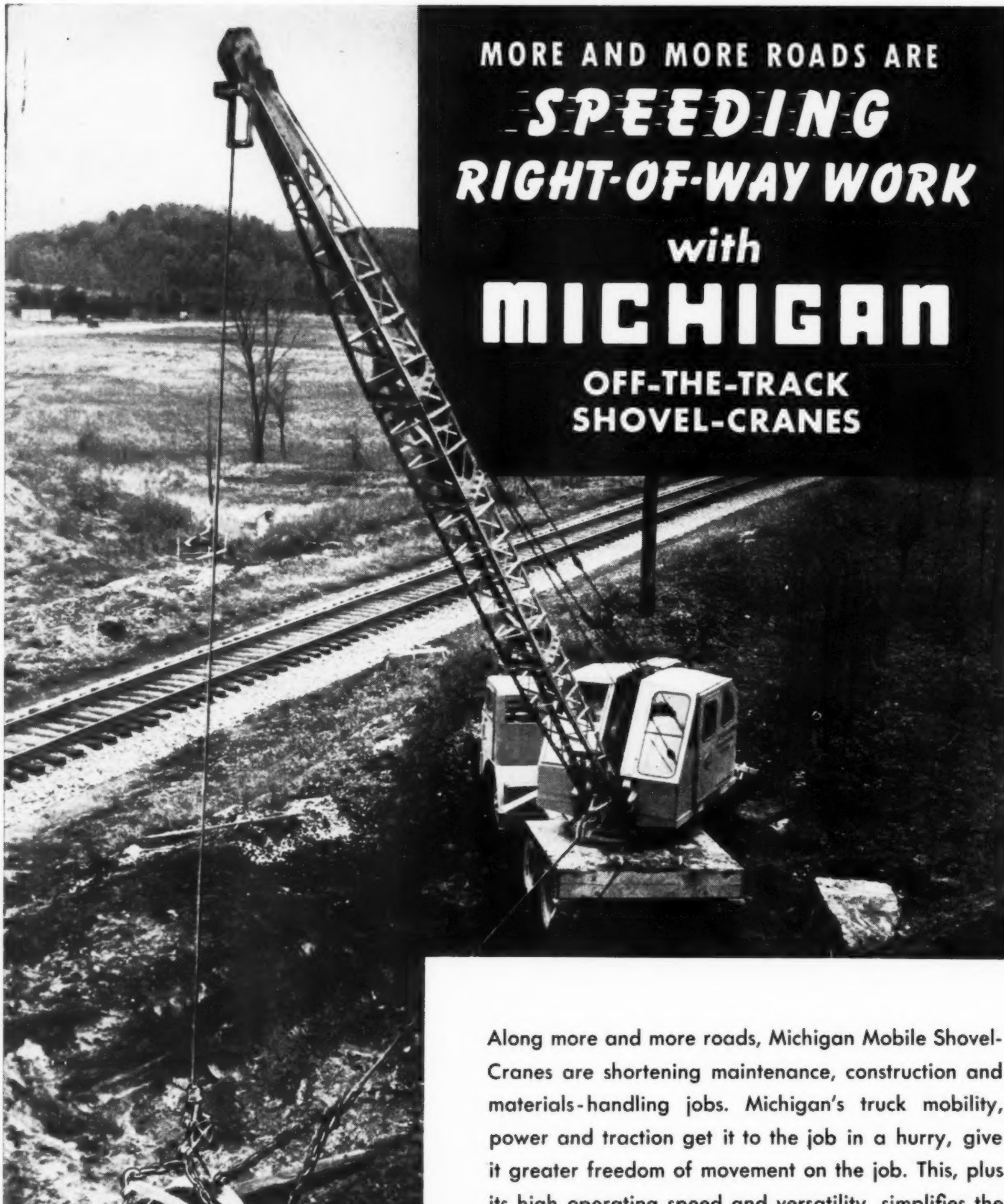

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No. 241 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Pulling Together in 1949

January 1, 1949

Dear Readers:

With this, the first issue of Railway Engineering and Maintenance in 1949, our entire staff wishes for all of you, and your railroads—A Happy and Prosperous New Year. Your railroads, as well as you, because it is only too evident that if the railroads do not enjoy a prosperous New Year, your own well-being, which is so closely linked to that of the railroads, may be adversely affected in one way or another.

No doubt, hundreds of others have expressed similar sincere wishes for your good in the year ahead. Implemented, these wishes could have a profound influence on your welfare during the next 12 months. But it is well for all of us to remember that wishing alone won't make it so. Whether we like it or not, 1949 will be for each of us only what we, individually and collectively, make it.

With this thought in mind, it is to be hoped that the New Year will bring the greatest of harmony and cooperation between you and your managements in facing the problems that lie ahead. For there will be problems—problems which, unless solved in the common interest, could jeopardize the welfare of all.

One of the foremost and fundamental of these problems, which must be evident to all of you, is the maintenance of the financial and physical integrity of the roads in the face of sharply rising costs. This is not management's problem alone, and cannot be solved by management alone. In its solution, your managements must have the cooperation and support of all of you, or outgo will outstrip income, with the inevitable threat of poorer service, curtailed construction and maintenance, reduced employment, and an eventual upheaval in the industry.

These are not pleasant things to contemplate as one enters the new year, but it would be foolhardy not to face the truth, and the truth is that many roads are confronted with a financial problem that is causing serious concern. One of the "musts" in the solution of this problem is to increase production commensurate with increased costs. This calls for better planning and the more efficient execution of all classes of work. There is no alternative——this must be your contribution to help balance higher wages, shorter hours, and other increased costs all along the line.

Working together, with the greatest good for all the goal, 1949 can be a happy and prosperous New Year for both you and the railroads. For our part, implementing our best wishes to you to that end, we shall endeavor to make every issue of Maintenance in the New Year of greater interest and helpfulness than ever before.

Sincerely,

Neal D. Howard
Editor

NDH:ag

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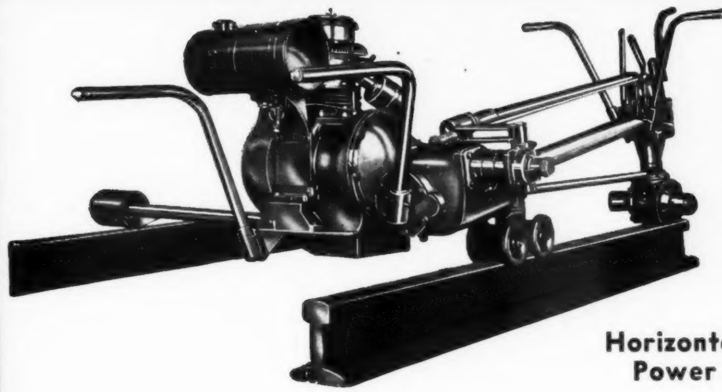

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1948 in Review—

Another Good Year, But With Much Yet To Be Desired

The year just closed was one of mixed blessings for the railroads, but, over all, it was a good year, which saw continued heavy freight traffic, somewhat higher earnings than in 1947, and substantial improvement in plant. At the same time, the railways increased their efficiency all along the line, whittled down the freight car shortage to only about one-half what it was in the previous year, and materially improved their service to the public—both shippers and passengers.

According to William T. Faricy, president of the Association of American Railroads, three facts stand out in the 1948 record of the railroads. The first is that the railroads moved with all-time record efficiency a freight traffic well above that in any prewar year, and only slightly below that in the record peace-time year of 1947.

The second fact is that increases in costs since 1939 have been so much greater than the increases in rates that, even while handling this tremendous traffic volume with record efficiency, the railroads were able to earn a return on the net amount invested in them of barely 4¼ per cent. Out of this return they had to pay interest, rentals, and other fixed charges, as well as a considerable part of the cost of providing necessary improvements, before there was anything left for their owners.

The third outstanding fact, according to Mr. Faricy, is that the railroads spent at least 1¼ billion dollars for improvements to their plant in 1948—a figure which may prove to be an all-time record for such expenditures in any one year to increase their capacity and improve their service to the public. A major element of this improvement program was the installation during the year of more than 100,000 new freight cars, compared with 63,000 in 1947.

Measured in tons of freight hauled one mile, freight traffic on the railroads in 1948 approximated 640 billion ton-miles. While this was slightly below the record peace-time traffic of 1947, it was 92 per cent above the freight traffic of 1939.

Passenger traffic in 1948 amounted to 40.4 billion passenger miles. This was 12 per cent less than in 1947, but 78 per cent more than in 1939.

During the year the railroads carried an average of 1,175 tons per freight train, the greatest on record. At the same time there was a slight increase in the average speed of freight trains compared with the two preceding years, so that the net output of transportation per hour by the average freight train was greater than ever before. The 1948 average output of 18,658 ton-miles of freight per hour compares with 10,580 ton-miles in 1929—a record of performance that was made possible only by improved operating methods, more powerful and efficient locomotives, better freight cars, improved signaling, road and yard facilities, as well as heavier loading.

Sparked by increases in labor rates in all departments, railway labor costs mounted rapidly during 1948, with the prospect that they will assume a still larger proportion of total expenditures in 1949. On December 17, a Presidential Emergency Board recommended the establishment for non-operating employees of a 40-hour week, effective September 1, 1949, and a wage increase of seven cents an hour, retroactive to October 1, 1948. The recommended 40-hour week would involve maintenance of the present 48-hour pay basis.

The Board estimated that the cost of the 40-hour week provision in 1949, when it would be effective only during the four closing months, would amount to about $150,000,000. This would indicate a full-year cost

of about $450,000,000, to which would be added the cost of the seven-cent increase ($190,000,000) to make a total of $640,000,000.

Total expenditures of the Class I roads for maintenance of way and structures during 1948 were the second highest on record. Based on official figures for the first ten months, it is estimated that these expenditures amounted to approximately $1,350,000,000. This figure gives effect to the wage increase of seven cents an hour, retroactive to October 1, recommended by the President's Emergency Board on December 17—but not yet accepted.

Unfortunately, this high figure for maintenance is so severely distorted by inflated costs that it does not accurately reflect the amount of work done compared with previous years. However, it is interesting to note that it is 11.4 per cent higher than the $1,212,096,000 spent for maintenance in 1947, only about 4 per cent less than the all-time record of $1,411,306,000 spent for maintenance in 1945, and compares with the five-year average expenditures of $849,021,000 for the years 1925 to 1929, inclusive.

Rail and Tie Renewals Down

The amount of new rail laid last year by the railroads was, on the whole, insufficient to satisfy their needs—especially to regain ground lost as a result of the combination of heavy traffic and inadequate renewals that prevailed during the war. Based upon information furnished by practically all of the Class I roads of the country, these railroads as a whole laid approximately 1,550,000 net tons of new rail in replacements during 1948. This represents a decline of 67,140 tons, or 4.1 per cent, compared with 1947, and a substantial drop from the amount of rail laid during the peak years 1944 and 1945. But the quantity laid in 1948 was higher than for any other previous year since 1930.

Tie renewals likewise were down in 1948, slipping to the lowest level in history. Renewals last year on Class I roads numbered approximately 36,500,000—a reduction of 790,000 ties, or 2.1 per cent, below those in 1947. This compares with the annual average tie renewals of approximately 46,645,000 ties in the five-year period 1941 to 1945, inclusive, and the more than 70 million ties installed for many years prior to 1930.

Prices of practically all classes of maintenance materials continued to rise in 1948. For example, the price of new steel rail, which started the year at $55 per net ton, had increased by the year's end to $65, and several mills had put into effect a further increase of $6 per ton. And it was the same way with ties. At the end of the year the roads were paying about 17 per cent more for ties than at the beginning.

Paced by rising labor costs and the urgent need for further economies in doing work, purchases of power tools and machines for maintenance-of-way and structures work continued high during the past year, totaling approximately 9,300 units, at an estimated cost of $18,700,000, as pointed out in the lead article in this issue. This represents reduction of about 200 units, and about $400,000, from the purchases made for similar equipment in 1947, but the 1948 purchases were larger than in any year prior to 1944.

Construction at High Level

A brighter picture was presented by the construction activities of the railroads last year—gross capital expenditures of the Class I roads for improvements to their fixed properties, according to figures developed by the Interstate Commerce Commission, totaling $331,000,000. This figure is $45,000,000, or more than 15 per cent, greater than the comparable expenditure for 1947, and also has the distinction of being larger than for any year since 1930. Even after allowance is made for increased costs as a factor in the upturn of expenditures for improvements, there is little question that the actual volume of work accomplished remained at a high level.

Satisfying as this should be to those in responsible charge of the fixed properties, it might well be somewhat disconcerting that the ratio of capital expenditures for the fixed properties to total capital expenditures for all improvements continues to fall. In 1948, for example, according to the estimates of the Interstate Commerce Commission, the $331,000,000 spent for improvements to road represents only 26.5 per cent of the total capital expenditures ($1,251,000,000) for all improvements, leaving 73.5 per cent, or $920,000,000 for equipment.

Good Start Indicated for New Year

What is in store for the railroads in 1949 depends upon many factors, some of which, obviously, cannot be evaluated accurately at the present time. Paramount among these, of course, will be the general economic health of the country. If this continues favorable, railway traffic can be expected to continue high. And if this high traffic volume is reflected in favorable net earnings, it can be assumed that maintenance and improvement work will continue at a high level.

According to estimates submitted by the railroads to the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission, and published by the Bureau in the latest issue of its "Monthly Comment," improvement activities, at least, promise to get off to a good start. These estimates show that the roads plan to get their 1949 improvement programs under way with first-quarter expenditures 39 per cent above those for the first three months of 1948. This would indicate expenditures for road amounting to approximately $71,000,000, compared with $59,000,000 for the same period of 1948.

ANNUAL INDEX—

How to Obtain Your Copy

THE INDEX of all material published in *Railway Engineering and Maintenance* during 1948 will soon be ready. Those who have requested copies of the annual index in previous years will automatically have one mailed to them this year. If you have not requested a copy of the index in any prior year, but desire to have a copy of the 1948 index, all you need to do is to fill out and mail the coupon on page 43 of this issue.

A total of about 9,300 units of work equipment was purchased in 1948 by the railroads of the United States, Canada and Mexico

Railways Spent $18,700,000 for Work Equipment in 1948

Reports from 427 companies indicate that the roads as a whole acquired 9,300 power machines and tools last year, a slight decline as compared with 1947 purchases

• A total of about 9,300 units of work equipment, costing approximately $18,700,000, was purchased by the railroads of the United States, Canada and Mexico in 1948. Both the number of units purchased and their dollar value show a slight decline as compared with 1947 when it was estimated that these railroads purchased 9,500 units of work equipment at a cost of $19,100,000. However, the figures for 1948 are far above those for any year of record prior to 1944.

The figure showing the number of units of work equipment purchased in 1948 is an estimate based on answers to a questionnaire sent to all railways of the United States, Canada and Mexico. Replies were received from 427 roads, the equivalent of 80 per cent of all the railways of these three countries, and including all but three Class I roads in the United States and one large road in Canada. Of the roads submitting replies, 176 reported purchases of work equipment totaling 8,579 units. In 1947, 174 roads reported purchases of work equipment totaling 8,450 units.

Beyond the Figures

To obtain an accurate picture of work equipment purchases in 1948 it is necessary to look beyond the totals. One fact that comes to light is that a larger than usual number of the smaller roads and terminal companies were in the market for work equipment in that year. Another is that, while the total purchases declined as compared with 1947, the majority of railroads reported increased purchases. Still another underlying development was a trend toward the purchase and use of an increasing number of large, high-production units, such as tampers. Other factors tending to have an influence on work equipment purchases were a continuance on a larger scale of the practices of leasing certain types of roadway machines from manufacturers and of utilizing the

There is a steady demand on the railroads for grading equipment of many types

services of well equipped contractors for carrying out roadway maintenance programs, especially where local labor shortages were a factor.

In spite of the decrease in 1948 purchases of work equipment are continuing only moderately below the peak established in 1945. As far as the need for work equipment is concerned, all the factors that have heretofore influenced the purchases of work equipment were present in 1948, some of them in intensified form. For instance, higher labor rates, which were in process of going even higher as the year ended, were an ever-present stimulus to obtain greater production per man-hour. A factor here was the growing realization that the time is rapidly approaching when the railroads will no longer be able to raise rates to offset increased wages without losing large amounts of business to competing forms of transportation. The factors tending to stimulate the purchase of more work equipment were offset to some extent by adverse elements in the situation. One of these was the inability of the railroads to get as much new rail as they desired to have, thereby limiting somewhat the need for machines used in laying rail. Reduced earnings on some roads also had an adverse effect on work-equipment purchases.

Measured by the number of units involved, motor cars continued to head the list of work equipment purchases. The 176 railroads reporting the purchase of work equipment in 1948 bought in that year a total of 2,175 motor cars. While this figure was larger than for any year prior to 1941, it represents a slight decrease from 1947, when 2,298 motor cars were reported purchased, and compares with purchases of 2,877 motor cars in 1946 and 2,738 in 1945.

On the other hand, purchases of push cars and trailers in 1948 increased sharply. A total of 1,307 such units were acquired by the railroads reporting purchases last year. This figure compares with reported purchases of 1,100 such units in 1947, and exceeds the previous high of 1,289 units, reached in 1946. An interesting sidelight in this connection is the reported purchase in 1948 of 25 hand cars and 54 velocipedes, which are not included in the figures for either motor cars or trailers.

An interesting feature of the work equipment picture for 1948 was a sharp increase in the numbers of automobiles and trucks acquired by the railroads. Purchases of such equipment by those companies reporting included 225 passenger automobiles, 763 trucks, and 19 trailers, a total of 1,007 units. This is a new high. It compares with reported purchases of 751 highway vehicles in 1947, 554 in 1946, and 410 in 1945.

Purchases of cranes constituted another bright spot in 1948. The number of such units reported purchased last year, including rail-laying cranes, amounted to 126, a figure that has been exceeded only once since these records were started, namely, in 1946, when 130 cranes were reported purchased. In 1947 the roads reported the purchase of 94 cranes. The figure for 1948 does not include derrick cars, of which 50 were acquired by the railroads reporting purchases.

Grading units constituted one of the categories of work equipment that fell below the previous year in the number of units purchased. The reported purchases of such machines in 1948 came to 281 units as compared with 290 units in 1947. While the figure for 1948 was also exceeded in 1946 and 1945, it was higher than the reported purchases for any previous year of record. Included among the grading units acquired last year were 13 draglines, 7 motor graders, 20 scrapers, 22 shovels, 8 spreaders, 71 tractors of all types, 69 bulldozers, 51 clamshell buckets, and 20 dragline buckets.

Reported purchases of equipment used in laying rail declined somewhat in 1948, but were still far above any year prior to 1944. Specifically, the railroads participating in this survey reported the purchase in 1948 of 845 units of rail-laying equipment, including 36 cranes, 142 bolting machines, 88 spike drivers, 24 spike pullers, 51 adzers, 267 power drills, 111 grinders and 131 power rail saws. Not included in the above total are 38 cribbing machines, which

A number of new machines for ballasting and surfacing work came into the picture in 1948

are nearly all of the type used in rail-laying work. Only 25 cribbing machines were reported purchased in 1947.

Machines used in carrying out ballasting and surfacing programs constituted another category of work equipment that was purchased in somewhat smaller amounts in 1948 than was purchased in immediately preceding years.

To be specific, the railroads reporting in 1948 purchased a total of 791 units of ballasting and surfacing equipment, as compared with 841 such units in 1947. Included in the total for last year were 84 power jacks, 302 tie-tamping outfits, 117 unit tampers, 210 tie-tamping tools, 50 tie-tamping units of the large, on-track type, 13 ballast Moles, and 4 diskers.

Many Power Plants Acquired

The tie-tamping outfits purchased in 1948, as well as the welding outfits and paint-spray units mentioned later, all include the power plants necessary for their operation. In addition, the railroads purchased a large number of power plants to replace worn-out units and to supply power for the operation of additional power tools purchased for use in bridge and building work. The reported purchases of power plants in 1948 totaled 314 units, compared with 271 in 1947. In fact, the purchase of such units in 1948 was the highest on record, except for 1946 and 1945 when they amounted to 379 units and 467 units, respectively. The power plants acquired in 1948 included 143 air compressors and 171 generators. Comparable purchases in 1947 included 151 air compressors and 120 generators.

For effectuating their weed-control programs the railroads reported the purchase of a total of 219 machines of various types in 1948. This figure compares with reported purchases of 235 such machines in 1947. The 1948 purchases included weed burners, mowing machines, weed spray cars, extinguisher cars and diskers.

Other classifications of work equipment reported purchased in 1948 include 29 grouting units, 53 paving breakers, 99 pumps of various types, 114 power timber saws, 62 welding outfits, 35 paint-spray outfits, 36 wood borers, 42 concrete mixers, 18 lifting magnets, and 11 rollers.

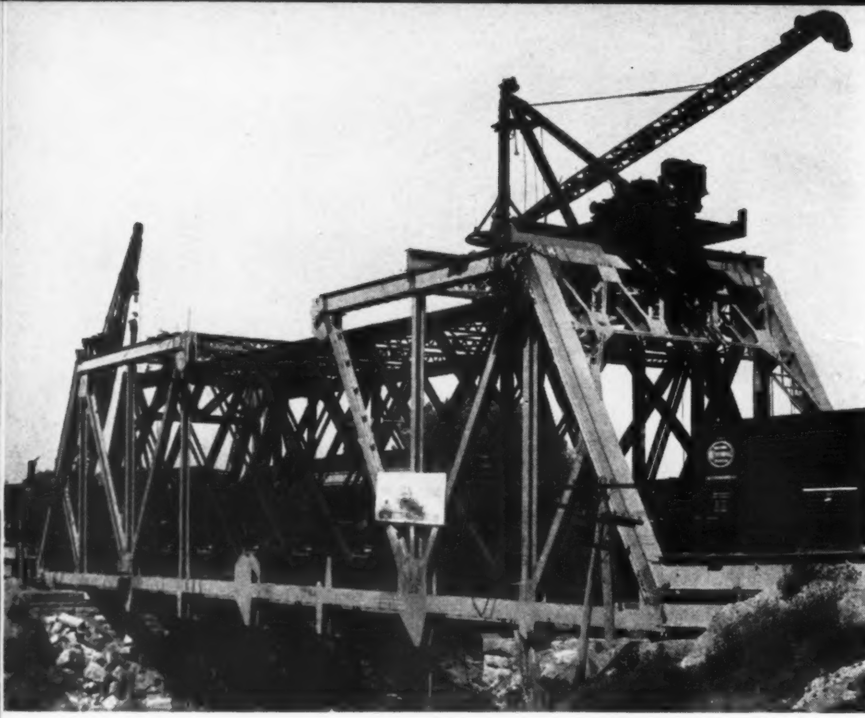
Work equipment purchases in 1949 will depend on a number of factors. Predominant among these are the general economic health of the country, railway earnings, and labor costs. Assuming the first two factors are favorable, it is certain that the demand for increased production and lower unit costs, which become more imperative with every increase in wage rates, will result in continuing large purchases of equipment. A new element that will be in the picture in 1949 is the impending five-day week for all non-operating employees, including those employees in the maintenance-of-way department.

A limited survey among a number of railroads has indicated that, if anything, work equipment purchases in 1949 will show an increase as compared with 1948. One large road, for instance, has indicated that its purchases next year will be about 70 per cent greater, measured by their dollar value, than in the previous year. Other roads have indicated that they will spend slightly less for work equipment in 1949, but it is expected that these decreases will be offset by substantial increases in the purchases of a smaller number of roads.

High Spots of 1948

Reported purchases of some of the more important categories of work equipment last year were as follows:

Motor cars	2,175
Push cars and trailers	1,307
Rail-laying machines	845
Ballasting and surfacing units	791
Grading machines	281
Automobiles and trucks	1,007
Cranes	126
Portable power plants	314
Grouting outfits	29



Erection view of Bridge No. 886. The gusset plates of new truss projecting below the lower chord are attached to the ends of temporary beams suspended from the old truss

Erects New T

By A. R. HARRIS
Engineer of Bridges
Chicago & North Western
Chicago

• For a recent bridge renewal project on the Chicago & North Western, involving the renewal of three major structures over the Boyer river in western Iowa, an interesting erection scheme was devised, which, while permitting the work to be carried out under traffic, eliminated the need of falsework bents in the river channel. At the various bridges new trusses were erected in a position just outside the corresponding trusses or girders of the old structures, and were supported during their erection by a system of longitudinal and transverse beams bolted to the undersides of the old spans. After the new spans had been completed and were carrying the traffic load, the same temporary beams, still attached to the new spans, supported the old spans while they were being dismantled.

The three bridges involved in this project, known as Nos. 876, 886 and 913, and all situated generally in an east-west direction, are located between Denison, Iowa, and Woodbine, where they carry the heavy traffic of the double-track main line extending between Chicago and Council Bluffs, Iowa. At Bridge No. 876 two 86½-ft. through plate-girder spans were replaced with a 175-ft. through riveted truss span and two 47½-ft. I-beam flanking spans; at Bridge No. 886 a 150-ft. through riveted truss span was replaced with a 190-ft. through riveted truss span and two 47½-ft. I-beam flanking spans; and at Bridge No. 913 two 85-ft. through plate-girder spans were replaced with a 175-ft. through riveted truss span and two 47½-ft. I-beam flanking spans. The superstructures of the old bridges were designed for Cooper's E-40 loading and for track centers of 13 ft. The old substructures consisted of stone masonry piers and abutments on timber-pile foundations. These were constructed for one track in 1883 and remodeled and extended for the second track in 1902.

Larger Openings Required

The Boyer river, flowing generally southwesterly in a narrow valley, has frequently overflowed its banks with damaging results to the roadbed of the North Western which lies in the valley from Denison to Missouri Valley, Iowa. After a flood in July, 1945, a drainage district was organized to straighten and improve the channel from a point north of Denison to a point west of Arion, where similar work was undertaken a few years earlier. The engineering officers of the North Western anticipated that the channel improvement would result in a faster discharge of water and, therefore, considered it necessary to enlarge the openings of the Boyer River crossings.

In the course of studies for the new structures consideration was given to the fact that, if delay in the delivery of steel made it necessary to carry falsework bents through the winter months, damage to them by ice might reasonably be expected. It was decided, therefore, to employ a scheme of erection that would not require falsework in the channel of the river. Accordingly, the plan, previously mentioned, involving the use of a system of temporary beams, was worked out, and outline sketches were prepared and bids requested for designing, fabricating and erecting the new steel spans based on this scheme of erection. The new spans were to be designed for Cooper's E-65 loading, 14-ft. track centers, and side clearances to trusses of 8 ft. 6 in. The American Bridge Company was awarded the contract for the steel work, including erection of the new spans and dismantling of the old, and developed the special details required for the erection, along with the preparation of the detail plans.

Meanwhile, the new piers and abutments, consisting of octagonal reinforced concrete piles capped with reinforced concrete bridge seats, were constructed. In this work the concrete piles were driven by railroad forces while the concrete work above the piles was done under contract by the Condon-Cunningham Company, Omaha, Neb. Before the erection of the new steel was begun, the old bridges and sections of track each way from them were raised, as necessary, these raises amounting to 2 ft. at Bridge No. 876, 6 in. at Bridge No. 886, and 1 ft. at Bridge No. 913.

While the erection work was in progress all trains operated under a slow order. During working hours traffic was diverted to one track, temporary crossovers having been installed for this purpose, while a locomotive crane, used in much of the erection, occupied the other track. During the night, however, both tracks were in service for rail traffic.

The temporary support system at Bridge No. 886 consisted of two lines of 36-in. beams extending longitudinally the full length of the old truss span, and seven 36-in. transverse beams, one located at each of the proposed positions of the panel points of the new truss span.

Trusses Without Falsework

When making studies in connection with the reconstruction of three double-track steel bridges over the Boyer river, the engineering officers of the Chicago & North Western were faced with the problem of devising a scheme for the erection of the new superstructures that would not require falsework bents in the river channel. This article describes how the problem was solved by using a scheme in which the new spans were supported during their erection by a system of temporary beams attached to the undersides of the old spans.

One line of longitudinal beams was placed directly beneath the lower chord of each of the old trusses and was suspended from it by hangers, one hanger at each panel point. Each hanger consisted of 1¼-in. bolts having at their upper ends a crossbeam bearing on top of the gusset plates of the bottom chord of the truss and, at their lower ends, another crossbeam under the bottom of the temporary beam.

Each transverse beam was suspended from the undersides of the longitudinal beams by bolted connections consisting of a combination of angle irons, gusset plates and steel bars. The ends of these beams projected outward from each old truss a sufficient distance so that the new truss could be erected with its center line 2 ft. 10 in. outside the center line of the old truss. The new trusses, while under erection, were attached by gusset plates to the ends of the transverse beams. Details of the beam hangers and connections are shown in one of the accompanying drawings.

Eight Operations Required

The erection work at this bridge, which required the use of a traveler crane in addition to the locomotive crane, was carried out in eight operations, as follows:

Operation 1:

(a) Erected the temporary longitudinal and transverse beams at the east end of the old truss span, using the locomotive crane.

(b) Erected three panels of new trusses at the east end, complete with top struts, portals and laterals.

(c) Erected traveler derrick on top of the new truss panels.

(d) Erected the temporary longitudinal and transverse beams at the west end of the old span and erected the three west panels of the new trusses.

Operation 2:

(a) Using the traveler crane, erected the closure pieces of the longitudinal beams and the remaining transverse beams. Erected the remainder of the bottom chords of the new trusses in cambered position.

(b) Placed in position the new flanking spans at each end of the bridge and the end floorbeams of the new trusses. Placed temporary beam spans from the old truss spans to the end floorbeams of the new.

Operation 3:

(a) Using the traveler crane, erected the remaining members of the new trusses in cambered position, with top laterals and struts.

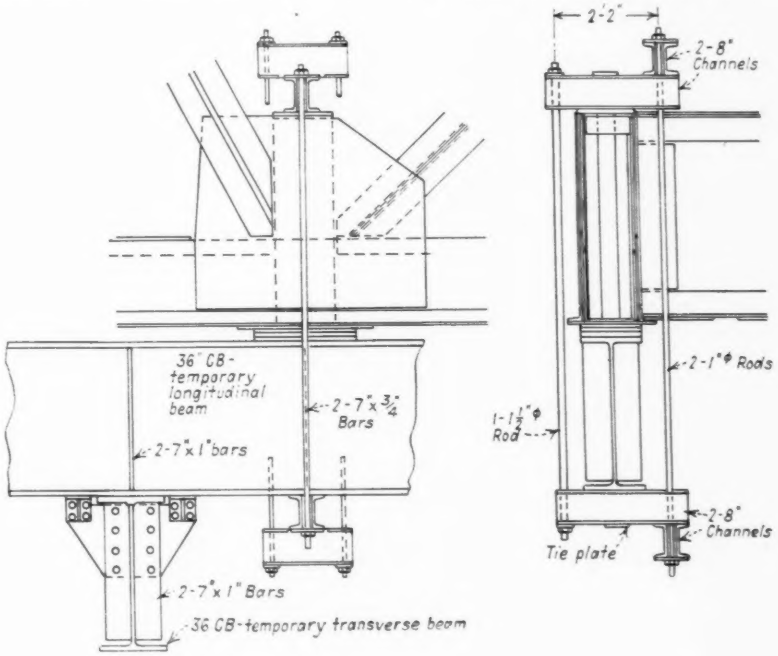
(b) Jacked each end of both new trusses to complete closure of the top chord.

(c) Released all hanger rods and swung both trusses on the new piers by lowering jacks.

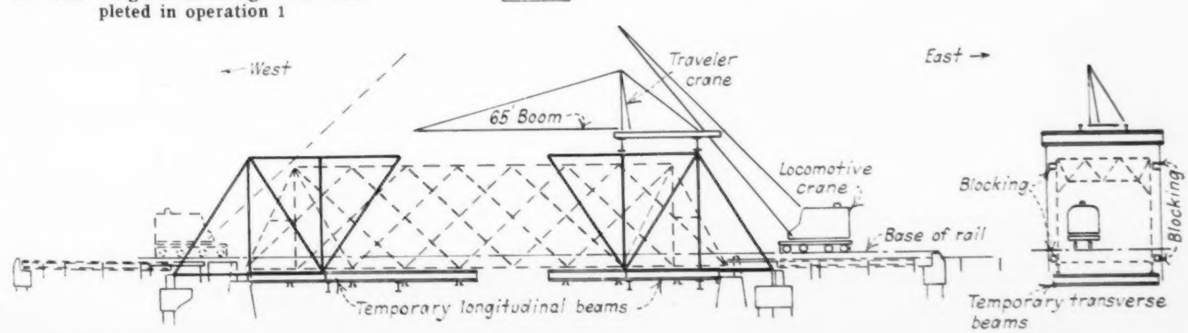
Operation 4:

(a) Shimmed all intermediate panels of old trusses to the tops of the longitudinal beams to transfer the live load and the weight of the old trusses to the new span.

(b) Jacked west ends of the new trusses



Right—Details of hangers and connections for temporary beams. Below—Erection Diagram showing work completed in operation 1



to relieve the dead-load stresses in the top chord of the old trusses preparatory to dismantling.

(c) Dismantled old trusses for re-erection at another location.

Operation 5:

(a) Removed the temporary beams from two panels.

(b) Removed old bottom-chord sections and old floor system for two panels.

(c) Installed new floor system in two panels.

(d) Placed ties and rails.

Operations 6, 7 and 8 were similar to Operation 5, each operation covering two panels of the new spans.

The erection procedure at Bridges No. 876 and 913 which involved old through plate-girder spans, was similar to that described for Bridge No. 886, except that the temporary longitudinal and transverse truss-supporting beams were attached to the old girders, and it was unnecessary to use the traveler derrick.

The steel erection work was started on February 16, 1948, beginning at Bridge No. 876, and was completed in June, 1948. The reconstruction of these bridges was carried out under the general direction of E. C. Vandenburgh, chief engineer, C. & N.W. The plans for the work were prepared under the supervision of A. E. Bechtelheimer, engineer of bridges (now retired), and the writer. The field work was carried out under the supervision of H. L. Barr, division engineer, and G. A. Linn, supervisor of bridges and buildings, of the Iowa division.

March Show To Be Special Affair

• Plans are in the making for what promises to be one of the most interesting and outstanding exhibitions ever staged by the National Railway Appliances Association. This exhibit will be held at the Coliseum, Chicago, on March 14-17, coincident with the Golden Anniversary meeting of the American Railway Engineering Association. At the time of going to press applications for space had already been received from 88 manufacturers for 208 booths. On the basis of this response it is expected that the exhibit will far surpass that of last year.

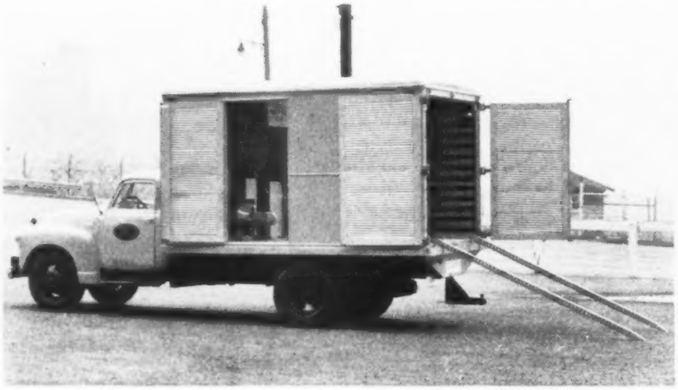
Aside from size, the exhibit is expected to be of special interest for other reasons. One of these is that the exhibit will have an effective tie-in with the fiftieth anniversary celebration of the A.R.E.A.—a number of manufacturers having indicated that the design of their exhibits will be given unusual study in view of the special nature of the occasion. Also, the exhibit hall will feature appropriate decorations in commemoration of the A.R.E.A.'s golden anniversary, which will be done in gold color and will carry a congratulatory note.

Another reason for the special significance of the exhibit is the fact that it will be the only such display in 1949 by manufacturers of products used in the construction and maintenance of railroad properties. As announced in the December issue, the N.R.A.A., the Track Supply Association, and the Bridge and Building Supply Men's Association have adopted similar resolutions to the effect that exhibits will be held in alternate years — the N.R.A.A. in March and the other associations jointly in September. These arrangements will take effect in 1949, with the N.R.A.A. exhibiting during the A.R.E.A. convention.

The Track Supply and the Bridge and Building Supply Men's Associations will not exhibit in September, 1949, during the concurrent conventions of the Roadmasters' Association and the American Railway Bridge and Building Association. However, these two supply associations have accepted an invitation from the N.R.A.A. to display their banners and membership lists at the March exhibit.

Space is still available and manufacturers desiring to participate in the exhibit should address their applications to Lewis Thomas, director of exhibits, National Railway Appliances Association, 59 E. Van Buren street, Chicago.

Below—The mobile welding shop. The track ramp at the rear is used for transferring the Nordberg grinder between the truck and the track rails. Right—Interior view showing grinder in the foreground, the oxyacetylene outfit in the left background and part of the welder in right background



Mobile Unit for Maintenance Welding

THE New York Central recently placed in service a mobile welding shop, built by the Davey Compressor Company, expressly designed for welding work on frogs, switches, rail ends and bridges. This unit consists essentially of a generator, a 300-amp. Lincoln welder, 1,000 ft. of welding cable, a Nordberg DG track-mounted surface grinder, and an oxyacetylene cutting and welding outfit, all mounted on a two-ton Chevrolet Loadmaster truck with Gramm body. The generator is operated by the truck engine through a Davey heavy-duty power take-off controlled by a shift lever in the driver's cab. The unit is accompanied by a house trailer, which serves as the living quarters for the three-man welding crew.

A 60-in. paved invert pipe in a fill on the Wayland-Deane line. Note horizontal rod with turnbuckle on the interior of the pipe. These rods were later removed

Above—Building a headwall of creosoted material for a Multi-plate pipe on the Wayland-Deane line. Right—Multi-plate pipe under a high fill on the same line

Modern Culverts for New Branch Lines

One section of twin 150-in. Multi-plate pipes on Jenkins-Pound line. Headwalls are creosoted timber poles and pile butts

• In the recent construction of two branch lines on the Chesapeake & Ohio to serve new coal mines, extensive use was made of corrugated-pipe culverts, employing a number of interesting features of design and construction. One of the new lines extends from Wayland, Ky., to Deane, Ky., and is 23 mi. long, while the other extends from Jenkins, Ky., to a point near Pound, Va., and is 14 mi. in length.

On the Wayland-Deane line the tracks at Wayland are carried on an embankment that serves as a dike to prevent the streets from being flooded when a nearby creek overflows. Several 36-in. asbestos-bonded culverts extending through this embankment were provided with flap gates to permit storm water to discharge into the creek at low-water stages, but to prevent high water in the creek from backing through the culverts. Corrugated culverts 48-in. diameter or larger were shop-strutted by means of horizontal rods with turnbuckles placed at close intervals across each pipe. After the fill of earth and rock was completed around and over the pipes, and had attained maximum compaction, the horizontal tie rods were removed.

At another point on this line 96 ft. of 84-in. Multi-plate pipe was assembled, bolted and then strutted vertically by means of hydraulic jacks and heavy timber sills and struts. Several Multi-plate culverts, ranging in size from 60 in. to 120 in., were provided with headwalls made of creosoted timber poles and pile butts, sawed and notched by hand on the job.

On the Jenkins-Pound line the smaller drainage structures consist of full-coated and paved corrugated pipe and reinforced concrete pipe. However, there are two Multi-plate culverts 150 in. in diameter on this line, one of them a twin culvert.

In this article, which is an abstract of an address presented before the Maintenance of Way Club of Chicago on December 13, the author questions whether many roadmasters and supervisors actually know the degree of perfection that is required in track maintenance to insure the smooth riding of high-speed trains, and then discusses the more important factors involved. Including the observations of the author over a number of years on several roads, the article warrants careful reading by all those responsible for the maintenance of high-speed track.

Problems in Maintaining H

By J. P. DATESMAN

Engineer of Track

Chicago & North Western, Chicago

• Present-day high-speed operation of both Diesel and steam-powered trains has brought about the need for greater refinement in track maintenance to provide safe and smooth-riding track at higher speeds. Many main-line tracks ride fairly well at 60 m.p.h., but when speeds are increased to 80 and 90 m.p.h., or more, lack of refinement results in rough riding.

The fundamental requirements of smooth-riding, high-speed track are perfect line, cross-level, gage and running surface. A track meeting these requirements is a maintenance officer's dream—seldom possible of attainment—but every effort should be made to secure as near perfection as conditions will permit.

To maintain track in perfect line, cross-level, gage and running surface it is necessary that the track have good rail and ballast, and near perfection in tie conditions. Ties should be adequate in number, properly spaced and fully plated, with sufficient anchorage to eliminate rail and tie movement. In addition, a full ballast section, especially on the outside shoulder, should be provided to prevent the movement of joint and anchor ties. It is also necessary to have a substantial sub-shoulder to stabilize the track structure and provide a firm foundation for the shoulder ballast. A firm subgrade, of course, is an absolute necessity.

Roadmasters' Responsibility

Track maintenance falls primarily on the shoulders of the roadmaster or supervisor, and the question arises whether all of these men actually know the perfection that is required in track maintenance to provide smooth-riding track at high speeds.

Assuming that rail, tie and ballast conditions are adequate for high speeds, it is up to the roadmaster to locate minor defects in line, cross-level, gage and running surface, and to pass the information on to the section foreman. Roadmasters in high-speed territories should ride over their sub-divisions at least twice each week for this purpose. Most of these inspections should be made from the rear ends of standard-equipment, high-speed trains, because minor defects will show up on such equipment, but will not always do so on streamlined equipment. Periodic trips should be made on streamlined trains, but if a track can be made to ride properly for standard equipment, it will ride well for streamlined equipment.

There is a difference of opinion as to the riding of steam and Diesel locomotives for the purpose of track inspections, because many false indications are secured in riding these units, brought about by the application of brakes and the action of the locomotives as a whole, which are not a direct result of track defects. However, periodic trips should be made over roadmasters' territories on locomotives as there may be isolated locations that result in rough riding of the power units that will not show up on the rear ends of trains; but the majority of track inspections should be made riding the rear ends of standard-equipment trains.

It is impossible for a man on the rear end of a train to guess at the location of a rough spot with reference to a mile post or some other fixed object and be close enough in the location to enable the section foreman to locate the spot quickly and definitely. The method in general use is to start counting telegraph poles immediately when a defect is noted, until some fixed object is reached. When furnished with a list of rough spots located in this manner, the section foremen can go directly to these spots without any question in his mind as to whether he is working at the right locations. Some railroads provide aid in locating these spots by marking the poles to show tenths, quarters, etc.

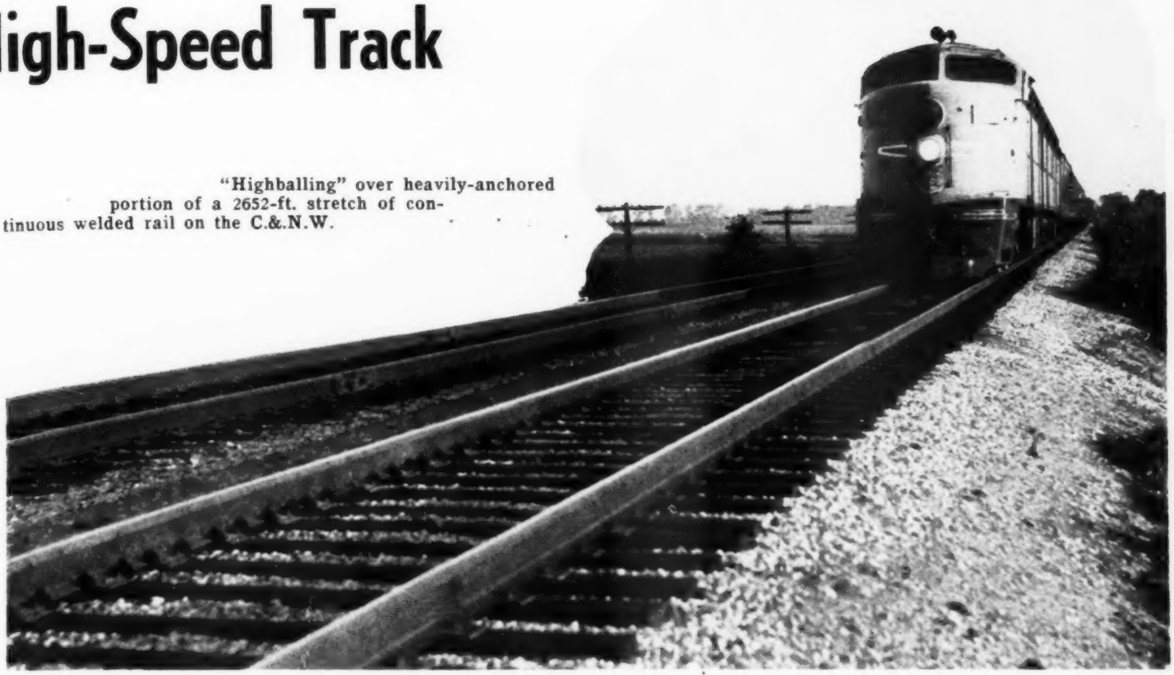
Locating Rough Spots

If the location of a rough spot is guessed at by the roadmaster, he may miss it by a considerable distance, and the foreman may go to the

Deep ditching, cut widening, and the installation of longitudinal and lateral drains, have paid large dividends in keeping surface water away from the subgrade

High-Speed Track

"Highballing" over heavily-anchored portion of a 2652-ft. stretch of continuous welded rail on the C.&N.W.



approximate location and spend a great deal of time leveling up the wrong piece of track. The actual rough spot, which might be the result of a low joint, or possibly a half rail out of cross-level or line, or slight variation in gage, might not be found at all. Section foremen should be thoroughly instructed by the roadmaster to repair rough spots promptly, for if they are permitted to exist they will generally grow in extent. Often the initial spot can be repaired in an hour or less, but if permitted to grow in extent an entire day or more may be required to make repairs.

Other Important Factors

The maintenance of turnouts has an important bearing on smooth riding, especially during hot weather, when the rail has a tendency to run into the turnout from both ends, with the possibility of serious line kinks, particularly at the heel of the switch points, near the guard rail, and at the heel of the frog. To forestall this rail movement it is advisable to provide additional anchorage where required. Switch ties should be properly tamped at all times to keep the rail in place on the slide plates. All switch and turnout material should be carefully installed according to standard plans and maintained to the highest degree of perfection obtainable.

Another essential to smooth-riding track is the proper shimming of heaved spots during the winter months. Many foremen are inclined to install short run-offs at heaved spots, which, of course, at high speed, will result in rough riding. In the fall and spring when the frost is going in and out of the ballast and ground, continual adjustment must be made to the shims and run-offs.

Control of weeds and grass, especially within the ballast section, is of vital importance. There are many methods of eradication, most of which produce good results if action is taken at the proper time. The use of ditchers, bulldozers, draglines and other types of earth-moving machines to improve drainage conditions, and to eliminate cuts which cause snow trouble, plays an important role in the maintenance of high-speed tracks.

With the advent of high-speed trains it has been necessary to increase the length of easement curves and to increase the superelevation of curves. If the elevation on a curve is such as to compensate for the high speed, or nearly so, there will be very little wear on the high rail, but the low rail, due to the slower moving freight trains and resulting overloading, will flatten out and develop considerable side flow of metal. Rail lubricators enter into this situation, and are a contributing factor in the prevention of wear on the high rail. Frequent checks should be made of the superelevation on curves by the section foreman, and also by the roadmaster, to eliminate as near as possible excessive settling of the low rail, which will eventually result in the rough riding of all classes of trains.

Use of Labor Forces

A large part of the heavy-tonnage territory of many railroads is in or near large industrial centers where there is usually a shortage of regular section labor. To compensate for this shortage, many roads are, or should be, establishing small extra or maintenance gangs in camps, at critical locations, so that roadmasters can utilize this labor supply where needed. Trucks or buses should be used in preference to track motor cars to handle these men, as such equipment will permit the delivery of the men to and from outlying points with minimum delay.

The use of grouped section forces for out-of-face surfacing is a controversial subject, but it is my opinion that such practice should be held to the absolute minimum. The needed refinement for high-speed tracks can only be carried out by the section forces. If these forces are taken off their home sections and are grouped for out-of-face surfacing work, track refinements go by the wayside.

The out-of-face surfacing of old

Building up rail ends by welding to reduce joint maintenance and impact forms an important part of rail joint maintenance—especially in high-speed territory

and new rail should be carried out by extra gangs, which should be furnished with modern, high-production tamping equipment. Regardless of the equipment used, however, there is bound to be a certain amount of settlement behind the surfacing crew, which, if not corrected quickly, will result in a variation of cross-level and line, and, in some cases, a variation in gage. Small pick-up crews, preferably regular section forces, should be worked closely behind the extra gang, especially when heavy raises are involved, to make the needed refinements for high-speed track. If pick-up crews are not used behind the surfacing gangs a certain amount of settlement will develop and grow in extent, with the possible result that riding qualities will not be greatly improved or protection given to prevent surface bending of the rail.

A stable subgrade has a definite effect on the riding qualities of high-speed trains. Practically all railroads have experienced difficulty in maintaining certain sections of track in cuts and on fills due to water or ballast pockets and slides.

We all know that wet cuts which heave excessively during winter months and are soft during summer months, due to sub-surface water, can in most cases be corrected by the installation of longitudinal intercepting drains, and that in many cases water pockets can be partially or permanently cured by the installation of lateral drainage. Many slides that occur on fills or in cuts can be corrected by the installation of longitudinal intercepting drains or stabilized by grouting. Cut widening, to provide surface ditches a greater distance from main tracks, pays dividends, and not only eliminates a great deal of snow trouble, but also keeps surface water away from the sub-grade.

The latest method of roadbed stabilization is the grouting process, which was started twelve or more years ago on certain railroads. This method, in most cases, has not been used long enough to prove conclusively that its application is more or less permanent; and it may be necessary to re-grout at certain locations. However, it has been definitely established that the various methods of stabilization and drainage have eliminated the necessity of large extra or maintenance gangs on some sections of track treated, with almost unbelievable savings.

The condition of rail ends and joint fastenings has a definite relationship to the smooth riding of track at any speed, and especially at high speed. Joint maintenance is one of the major responsibilities of the section forces and should receive a great deal of attention from roadmasters and supervisors.

Rail Joint Conditions

A very small amount of rail-end wear sets up a definite impact on the joint fastenings and ballast section, and an adverse condition develops very rapidly after initial wear takes place. Joint impact causes low joints and pumping track, which, unless corrected, will result in track that is out of surface, line and gage. Some railroads watch joint conditions very closely, as well as rail-end wear, and make corrections before excessive joint batter develops. One procedure is to renew the old bars with reformed bars that have a slight overfill, to compensate for the wear in the fishing of the rail, and then to carry out the necessary rail-end welding to reduce batter. Other temporary methods of correction include the reversing of angle bars and the installation of shims. In some cases, where it is necessary to defer rail renewals for a short period, angle bars can be crowned by applying heat to the base and base fillet of the bars while in track.

Another important item in joint maintenance is the lubrication of joint fastenings, preferably in the spring and fall, to provide for the free movement of the rail with expansion and contraction. In addition, definite steps should be taken to maintain proper bolt tension. Loose bolts should not be tolerated, as they hasten joint and rail-end wear and shorten the life of joint and shoulder ties.

Regardless of the degree of efficiency of joint maintenance, it can be assumed safely that between 40 and 70 per cent of the time of section forces is spent on track laying and surfacing, and that a very large portion of this time is on joint maintenance. This adds up to a sizeable sum of money during the life of the rail and fastenings. The actual cost of joint maintenance would probably surprise maintenance officers if all of the intangibles, such as the cost of rail-end work, the renewal of joint fastenings, the mechanical wear on joint and shoulder ties, and the damage to rolling stock, as well as the cost of joint lubrication and bolt adjustments and renewals, were known.

Continuous Welded Rail

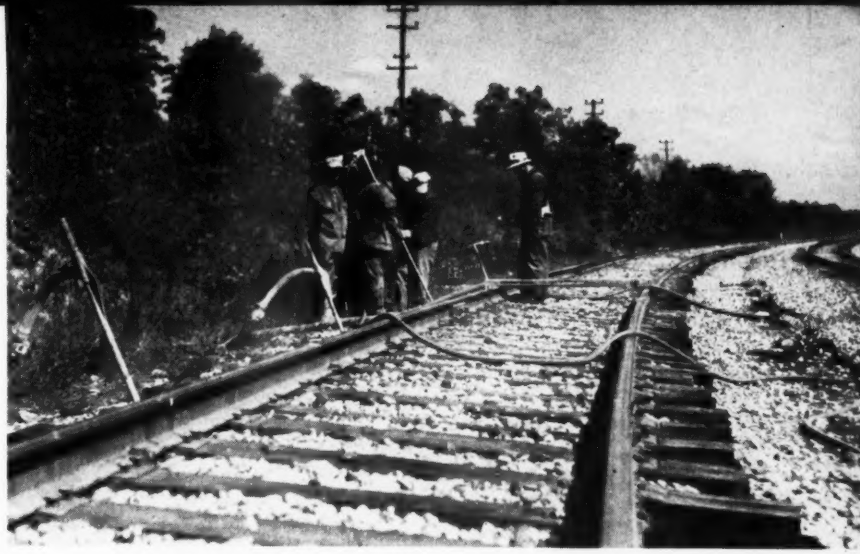
Considering the above, it appears that as many joints as possible should be eliminated by welding methods. It has been found from actual experience that where joints have been thus eliminated—over unstable sections of track, and through station grounds and highway and farm crossings, where poor drainage conditions exist—there is practically no movement of the track, regardless of the type of ballast used. It would also seem advisable to eliminate joints by welding over bridges, both the ballast and open-deck types, to reduce impact, and through tunnels where joint-fastening deterioration is rapid. The initial cost of such work is generally offset by savings in maintenance costs when the life of the rail is considered.

There are many locations where unstable roadbed conditions exist, where 78-ft. or 117-ft. welded rails can be installed, and, by the elimination of the proportional amount of joint impact, a decided reduction achieved in maintenance costs. Many railroads have laid continuous welded rail of various lengths, and records of savings in maintenance costs to date tend to substantiate the belief that the initial additional expenditure for the welds was justified.

There has been considerable difference of opinion as to how the expansion and contraction of continuous welded rails should be controlled, but experience has demonstrated that where welded rail has been installed in sections of track on stable subgrade, where spot surfacing is not necessary during hot weather, expansion and contraction can be

controlled by proper anchorage. Friction from double-shoulder tie plates also tends to hold the rail. In the body portion of the long stretches, I do not believe heavy anchorage is required, as tie-plate friction, together with the opposing forces of expansion and contraction, tend to hold the rail from moving. There is no question that the ends of long stretches should be heavily anchored, as at these points there is definitely some place for the rail to move, and the opposing forces are reduced.

The growing use of welded rail in all lengths and under all conditions has been encouraged by the reduction resulting in maintenance costs, and also by the fact that the elimination of joints has produced smoother riding track at high speeds.



Roadbed grouting—the latest method of track stabilization—is bringing about almost unbelievable savings in man-hours of track maintenance

Ballast Important

Probably the most important factor governing smooth-riding track at high speeds, or in fact at any speed, is ballast. It has been the general practice, and probably will continue to be such, for railroads to use material for ballast that is accessible on their lines with minimum line haul, but there is no question that, in the long run, such procedure is not always economically sound.

Some roads are fortunate in having deposits of hard rock on their lines which does not deteriorate under traffic, but many roads are not so fortunate. Consequently, they have used limestone of various degrees of hardness, and in some cases very soft limestone which has resulted in disastrous conditions.

It has been my good fortune to have been employed in capacities which have permitted me to make a thorough study of ballast conditions on many railroads. These studies have definitely established one very important fact—that stone ballast, regardless of its hardness, must be drainable. When ballast is fouled to the extent that it is not drainable, rough-riding track will result.

The drainability of different kinds of ballast depends, of course, on its size, hardness, and the type of traffic passing over it. In hard rock ballast, such as trap rock, fouling is generally the result of an excessive amount of engine sand, front-end cinders, car droppings and wind-blown material which filters down into the voids. In soft-limestone territory, the fouling of ballast is generally the result of the deterioration of the ballast particles under traffic. This produces limestone dust which combines with engine sand, cinders, car droppings and wind-blown material to produce a cement, mortar-like mixture which not only fills the voids of the ballast, but encases the ties to the extent that water is trapped around them and cannot drain off.

Cleaning Ballast

Rock ballast fouls primarily from the top, regardless of its hardness. When this occurs, its drainability ceases and definite steps must be taken to clean the ballast if it is cleanable. Hard rock ballast is cleanable, but there is some question as to whether soft limestone ballast is cleanable after it has become completely fouled, due to the fact that the disintegrated limestone forms a cement-like mixture around each ballast particle, which it is practically impossible to remove.

Many railroads use ballast with maximum sizes up to $2\frac{1}{2}$ in. and 3 in., and have secured excellent results, especially when the ballast is graded in size to result in smaller voids. Other roads use slag and gravel ballast and various kinds of rock graded to a maximum size of $1\frac{1}{2}$ in., with a proportional amount of smaller sizes to produce a material with as few voids as possible. Studies are being conducted along the lines that possibly ballast of the smaller sizes, with a proportional reduction in voids and increased bearing surface, should be given consideration. It appears that ballast of smaller particles would be more workable not only in its application, but also in ordinary maintenance work.

There are many machines on the market for the cleaning of rock and slag ballast. All of them produce good results, but some do not have the productivity desired. Manufacturers of work equipment are conscious of this fact and are striving to build machines that will produce on a large enough scale to make their use economical.

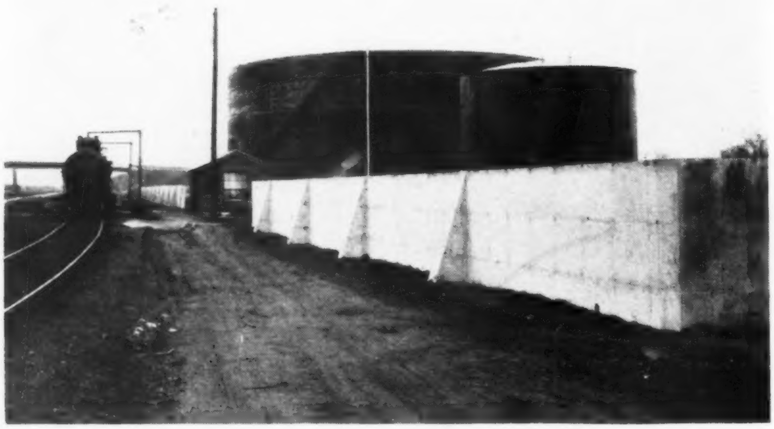
Advantages of Good Gravel

In territories where hard rock is not accessible, but where good gravel deposits are available, a good grade of washed and crushed gravel should be considered as ballast in place of the softer limestones. Gravel can be graded so there will be the minimum of voids to retard fouling and thus permit it to remain drainable. It is a well-known fact that gravel is workable under all conditions, and that it can be easily spot surfaced and lined by small section forces. A large percentage of crushed material is desirable in such ballast, as the sharp edges will hold the material in place and reduce the possibility of the track going out of line and surface. There is no question that the maintenance costs of gravel-ballasted track is considerably less than that of rock or slag-ballasted track, and that its drainable life is longer.

As long as rock or slag ballast remains drainable and pumping action is not noticeable, the track will remain in fairly good line and surface, but as soon as drainability ceases and pumping action starts, the track will go out of line and surface. In hard-rock territory the ballast can be cleaned and reused, but in the softer limestone districts the ballast should be removed and new material placed. Ballast cleaning and out-of-face surfacing are expensive operations, and I believe all will agree that such operations must be carried out more frequently on track that is ballasted with rock or slag than on track ballasted with gravel.

Getting a S

With the increasing use of Diesel power on the railroads, fuel oil storage became a problem of vital importance. This article tells how the problem was solved on the Chicago, Burlington & Quincy. It presents a brief history of the expansion of fuel-oil storage capacity on the road, and describes in some detail its most recent and largest installation, by means of which it attained a satisfactory margin of reserve capacity.



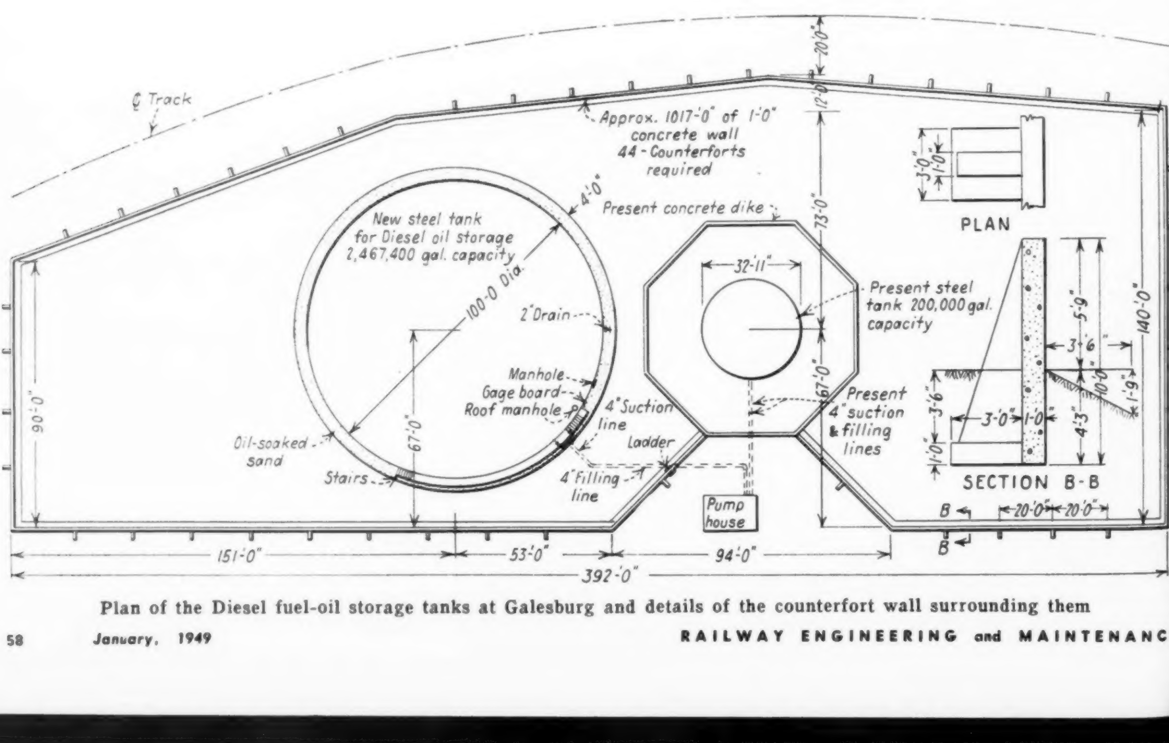
The fuel-oil storage and handling facilities at Galesburg

• Last month the Chicago, Burlington & Quincy improved its position in regard to the amount of storage capacity available for holding reserve supplies of Diesel locomotive fuel oil. This situation was attained with the completion of a 2,467,400-gal. storage tank at Galesburg, Ill., raising the total storage capacity for the system to 7,123,000 gal. With 453,700 hp. of Diesel locomotives in service (31 passenger, 46 freight and 115 switching locomotives), consuming about 200,000 gal. of oil daily, the system storage capacity now provides a 36-day reserve supply.

In 1934, when the Burlington inaugurated the Diesel Zephyrs, the revolutionary nature of the step was not immediately apparent, and future requirements in regard to fueling facilities for Diesel locomotives could not be foreseen with any certainty. As additional Diesel power was placed in service from year to year, fuel-oil storage facilities were added to keep pace with current requirements, but until recently these facilities did not provide a satisfactory margin of reserve.

When it was realized that the Diesels were here to stay, the desirability of having a storage capacity for fuel oil in excess of current requirements to meet emergencies, such as production stoppages in the refining industry, and to take advantage of price fluctuations, became apparent. To provide this capacity the plan on the Burlington was to install large storage tanks at two locations, one centrally located on its Western lines and one on its Eastern lines. From these tanks fuel oil could be distributed, in emergency, to other storage points on the system. However, because of the war-induced shortage of steel and the continuance of this shortage after the war, it was not until 1944 that the desired storage capacity for the Western lines could be provided, and not until 1948 that sufficient steel for the eastern storage point became available.

The storage tank for the Western lines is located at Lincoln, Neb. This tank was originally used by the Fort Worth & Denver City (a Burling-



Plan of the Diesel fuel-oil storage tanks at Galesburg and details of the counterfort wall surrounding them

Safety Factor in Fuel Oil Storage

ton subsidiary) for the storage of residual oil in Texas. It was dismantled, moved to Lincoln, and there re-erected, adding 2,338,000 gal. to the road's storage capacity.

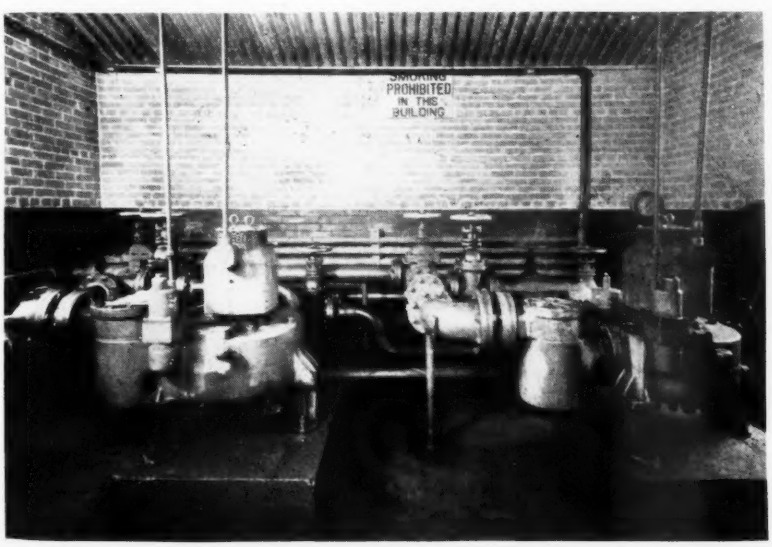
Facilities at Galesburg

To provide the desired reserve storage capacity on the Eastern lines the plan was to install a large tank at Galesburg. This location was chosen because it is a large terminal centrally located with respect to other fueling points, and because it is within convenient distance of the road's fuel-oil market—Kansas City and points south. The tank at Galesburg, made of new steel, is 100 ft. in diameter by 42 ft. high, and has a capacity, as mentioned previously, of 2,467,400 gal. It is located adjacent to an existing 200,000-gal. tank which was continued in service. The small tank is surrounded by a concrete dike enclosing an octagonally-shaped area, the center of which coincides with the center of the tank. A new concrete dike, located to clear existing trackage, was constructed to enclose an irregular area containing both the new tank and the dike of the existing tank. A plan of the layout and details of the new wall are shown in the accompanying drawing.

The foundation for the new tank was prepared by first excavating to a depth of 15 in. a circular area having a diameter 8 ft. greater than that of the tank, then backfilling with 12 in. of crushed stone (of the same type and size used for ballast on the Burlington) placed in 3-in. rolled layers and, finally, placing on top of the crushed stone a 3-in. rolled layer of oiled sand. The foundation slopes radially from the center of the tank, the total fall at the periphery being 3 in.

For transferring oil from tank cars to the storage tanks an unloading track with a capacity of four cars was provided. This track has four unloading rigs, each consisting of a 3-in. steel pipe set upright on a concrete foundation, and a 3-in. aluminum pipe joined to the top of the vertical pipe by a double swing joint. When a car is to be unloaded the aluminum pipe is raised to a horizontal position with its outer end over the manhole of the tank car, and another length of 3-in. aluminum pipe, with one end inserted into the tank car, is joined to the horizontal length by a 3-in. union with grips for hand tightening of the joint. As the oil is unloaded it passes through a strainer.

For handling oil to and from the storage tanks two centrifugal pumps, each with a capacity of 300 g.p.m., were installed. The pumps are cross connected so that either of them may be used for transferring oil from tank cars into the storage tanks or pumping oil from the tanks back into cars if it should become necessary to draw on this reserve capacity. They are also used for pumping oil from the storage tanks to the fueling outlets. The pumps are operated by remote control. All outgoing fuel oil is metered and then filtered through a removable cartridge type filter.



The Galesburg pump house has two pumps for handling oil to and from storage tanks

Fuel Oil Tanks at 49 Points

The Burlington now has in service Diesel fuel oil tanks at 49 points on the system, including the large storage tanks at Lincoln and Galesburg. These tanks are of four different types — underground cylindrical tanks, dismantled steam locomotive tenders, and above-ground vertical and horizontal tanks. For the most part the first installations were buried. Later the practice of burying the tanks was discontinued (except where required by local ordinances) because of the difficulties experienced at some locations when the oil became contaminated with water.

During the war the road experienced difficulty in obtaining new tanks for local storage needs at fueling points. However, it was able to acquire enough secondhand tanks to meet the rising requirements. Some of these were obtained from gasoline filling stations and bulk plants that had been abandoned during the period of gasoline rationing. After the war the expansion of fuel-oil storage on a local basis was facilitated by the purchase of surplus tanks from the government.

All above-ground tanks are encircled by dikes, either of earth or concrete, depending on the area available in the vicinity of the tanks. Each dike is designed to retain a volume equal to $1\frac{1}{2}$ times the capacity of the tank. All the tanks are painted and otherwise maintained by the Burlington's bridge and building forces.

All of the Burlington fuel oil facilities were constructed under the general direction of H. R. Clarke, chief engineer, and under the direct supervision of A. H. Simon, engineer of buildings. The Galesburg tank was constructed under contract. The work was started in October, 1948, and completed two months later.

First Report on Tie Research

• No definite conclusions, but some interesting findings, are disclosed in the first annual progress report on the joint investigation of crossties that has been undertaken by the Association of American Railroads and the National Lumber Manufacturers' Association. This investigation is being conducted under the supervision of a joint committee composed of representatives of the two groups, which is headed as chairman by G. M. Magee, research engineer, Engineering division, A. A. R. The agency through which the investigation is being carried out is the research staff of the Timber Engineering Company (subsidiary of the National Lumber Manufacturers' Association), of which Carl A. Rishell is director of research.

The first annual progress report, comprising 78 typewritten pages, describes the progress that has been made in furthering various "projects" of the investigation, as follows: Determination of the causes of tie deterioration; review of patents; survey of literature; modification of wooden crossties; laminated and composite crossties; and end treatment to prevent checking and splitting.

Tie Deterioration

The investigation of causes of tie deterioration, as explained in the report, consisted of two phases, namely, field trips by the technician-in-charge to inspect and study tie deterioration, and laboratory tests to determine the nature of changes that take place in the chemical composition of the wood in railroad ties during service. In a discussion of tie deterioration the report deals at length with the causes of checking and splitting, and states that the most ideal way to eliminate splitting would be "to treat the tie so as to equalize the various stresses during seasoning."

The section of the report on tie deterioration also shows how direct loads may be a factor in causing crushing of the wood fibers, and discusses the role of abrasion in the weakening of the wood. The infiltration of sand and other foreign particles into the wood as a factor in hastening abrasion is given consideration, and the results of preliminary chemical tests to determine what changes take place in the chemical composition of the wood in railroad ties were described.

That part of the report dealing with the work done on modification of wooden crossties consisted entirely of a description of equipment being developed for the supersonic treatment of wood ties. The purpose is to determine the value of supersonic phenomena "in improving the treatability of wood and consequent modification of wood properties."

A considerable portion of that part of the report dealing with laminated and composite crossties was given over to a description of a gluing jig that had been designed to facilitate the manufacture of laminated wood ties. An important feature of the jig is the use of high-frequency current to procure rapid curing of the glue.

The study of end treatments was undertaken for the purpose of evaluating selected end treatments for their effectiveness in retarding end checking and splitting of ties prior to preservative treatment. In a summary of this phase of the investigation the report said that the effect of ten types of end coatings and two other types of anti-splitting methods are being tested on a total of 204 red oak tie sections which were green from the saw at the start of the test. Some of the sections have mitered ends for the purpose of determining the effect of this manner of cutting on end checking and splitting during seasoning. Monthly inspections of each tie section will provide data on the loss in weight due to moisture evaporation and the development of checks on the coated and uncoated ends. Results of a two-month exposure of a number of sections treated with five different end coatings have been tabulated.

Power Tools on the Job . . .

. . . Chain Saws Speed Bridge Renewal

WHEN the Illinois Central replaced an old through truss bridge in 1948, power chain saws rendered valuable service in helping to expedite the work of changing out the spans. In this project the old bridge, which consisted of three spans, was replaced with six deck plate-girder spans. Briefly, the work was done by first providing timber-pile falsework under the old spans; then dismantling the old trusses (leaving the pile-supported floor system in place to carry traffic), and finally shifting each new span into final position from temporary supports alongside the old structure.

Before each new span could be shifted the temporary piling under the old structure had to be cut off to clear the underside of the new span. With the objective of speeding up this operation as much as possible to minimize delays to traffic the work of cutting off the piles was done with chain saws, of which several were made available on the job. In one instance a chain saw cut off 28 of the piles (untreated pine) in 22 min., with the actual cutting time for each pile averaging 30 sec. Shown above is one of the saws in action.

Maintaining Curves With a String—

Adjusting Reverse Curves

Part V of a Series

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Going beyond the usual treatise on string lining, which considers only simple and compound curves, the author in this installment discusses the problems presented by reverse curves and shows by three specific examples, carefully presented and explained, how such curves can be string lined as readily as simple curves. Particular attention is given to passing the point of reverse curvature and the introduction of suitable spirals at this point, connecting the two simple curves with the least distortion of the simple curves themselves. With a complete understanding of the solution of such problems, the string liner will be in a position to solve any curve that is likely to be encountered anywhere in track.

HERETOFORE, all the instructions have applied to simple or compound curves—that is, curves in one direction, although they may be composed of parts with different radii. In rough, hilly terrain, or when following the course of streams, it often happens that a curve in one direction will be followed by a curve in the opposite direction without any intervening tangent. These are known as reverse curves.

If, as often happened when the railroads were built, the curves were reversed on a point, there was no opportunity for the trackman to insert any easement curves between the two reversed curves without increasing the curvature of both curves. Furthermore, there was no place where the elevation on one rail could be passed to the other rail without having an out-of-balance condition, which was very noticeable on light curves and really dangerous on the sharper curves. To ease this abrupt change, trackmen unwittingly changed the direction of the common tangent somewhat at the point of reverse and inserted short spirals by eye. To accomplish this it was necessary to increase the degree of part or all of the regular curves on each side of the reversing point.

In the case of simple, one-way curves, the trackman could extend half of the spiral at each end out on the tangent, but with reverse curves there was no tangent that could be used, so the distortion was necessarily very abrupt. As a result, the reversing point had to be protected by slowing down trains, and the increase in degree of the adjoining curves generally required a speed restriction also.

The reverse curves were necessary in the first place because of physical conditions, which usually still exist. The route may be in deep rock cuts or on side hills where the change in line to avoid the short spirals would be too costly or impracticable. However, by the use of string-lining methods, the best possible alinement can be found, utilizing every inch of available throw to the best advantage.

In such cases, the computer should be the recorder also, and should see that every side measurement is taken which will affect or limit his finished work. By being on hand himself he can visualize what the effect of his resulting throws will be at or near the point where the spiral joins the regular curve and that they will be toward the low, or inner, rail.

Measuring the Curve

In measuring up a reverse curve, the station numbering should be carried through continuously. When the ordinates have become zero, or as near as possible to zero, three or more stations are carried across the track to the other rail and the work carried on as before. After the last ordinate on one rail is recorded, a line should be drawn across the notes and marked "P.R.S." (point of reversed spirals) as it is essential to know just when the ordinates changed to the opposite rail. Of course, if rail lengths were used as

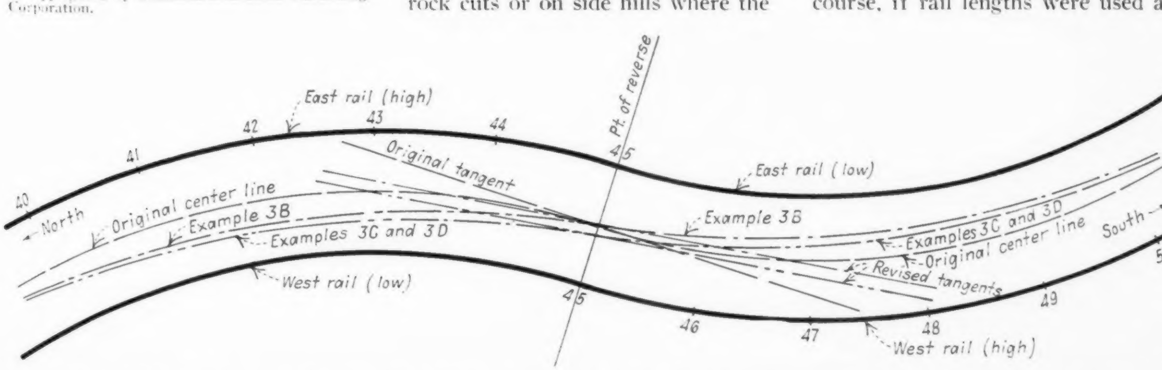


Figure 5—Sketch, tied to examples 3B, 3C and 3D, showing how direction of common tangent at reverse point may be changed, and how reverse point may be thrown to make revised curve better fit local conditions and obtain best possible spirals

stations on the first curve, the same length stations must be used on the second curve and, as joints will not be at the station locations, these lengths must be laid off with a tape. If a third reverse curve follows the second curve, the same process should be continued. The writer has worked as many as four reverse curves in one series with continuous stationing and solving them as one problem.

In the case of simple curves, or compound curves, the final figures in each column at the end of the curves must be zero; the zero in the sums column meaning that the central angle, and no more, has been used, and the zero in the half-throws column meaning that the final station is exactly on the tangent. Since the central angle is entirely used, the direction of the final tangent is parallel to that from which the original notes were taken, and since the final station falls on that tangent, the solution is a correct re-alinement of the curve.

With reverse curves following each other without intervening tangent, the above will apply only to the final station in a series of curves. The direction of the common tangent at each reverse point may, and probably will, be changed, and there may be a throw in either direction at each such point also. The amount of change and the amount of throw may be varied at will to make the revised curves fit the local conditions and to obtain the best length and rate of spirals possible. (See Figure 5.)

Making Calculations

The computations are carried out exactly as for any other curve, except that the reverse point is approached with a deliberate positive error in the sums column. The error cannot be very large or the resulting throws will be excessive both ahead of and beyond the reverse point. This error is the change in common tangent to be used in obtaining longer spirals.

As the reverse point is passed, however, the sign of the error is changed, i.e., if the error in the sums column at the station of reverse is 10 and the error at the next station is 1, the new figure to be placed in the sums column will be —9 (the 10 being changed to —10 as the reverse is passed). Likewise, in figuring the half-throws, if the figure in the sums column at the reverse point is 10 and that in the half-throws column is 4, the half-throws for the next station will be —14, the sign of the sum being changed as the reverse point is passed.

To have a positive error in the sums column at the reverse point, and at the same time to lengthen the spiral, it is usually necessary to increase the revised ordinates on part or all of the circular portion of the curve ahead of the spiral by one point each. In other words, the decrease in the rate of the spiral increases the error so much that part of the decrease must be balanced by an increase of the ordinates in the circular curve. The best method is to try a small error at first and increase it as much as possible by successive trials until a satisfactory solution is obtained.

Also, in most cases, the best line will cross the original line at the reverse point, in which case the half-throw there will be zero. Therefore, it will be best to make such correction as is necessary to have a zero at the reverse point, with a reasonable error in the sums column, before going far into the computations for the following curve. It is usually best to have the rate of the spirals on either side of the reverse point as nearly equal as possible, so the first trial should be made with similar spirals adjoining the reverse point.

1	2	3	4	5	6	7	8	9	10	11	12
Sta. Nos.	Orig. Ords.	Rev. Ords.	Diff.	Sums Diff.	Half Throws		Rev. Ords.	Diff.	Sums Diff.	Half Throws	
32	69	70	-1	-1	5						
33	72	71	1	0	4						
34	73	"	2	2	4						
35	61	71	-10	-8	6	OK	71	-10	-8	6	
36	78	"	7	-1	-2	+	72	6	-2	-2	
37	74	"	3	2	-3	+	72	2	0	-4	
38	59	71	-12	-10	-1		71	-12	-12	-4	
39	68	66	2	-8	-11		66	2	-10	-16	
40	61	55	6	-2	-19		55	6	-4	-26	
41	45	44	1	-1	-21		44	1	-3	-30	
42	46	33	13	12	-22		33	13	10	-33	
43	25	22	3	15	-10		22	3	13	-23	
44	8	11	-3	12	5		11	-3	10	-10	
45	0	0	0	12	17	"PRC"	0	0	10	0	
46	12						11	1	-9	-10	
47	25						22	3	-6	-19	
48	35						33	2	-4	-25	
49	50						44	6	2	-29	
50	60	55	5	7	-27	OK	55	5	7	-27	
51	64	65	-1	6	-20	-	66	-2	5	-20	
52	66	65	1	7	-14	-	"	0	5	-15	
53	67	66	1	8	-7		"	1	6	-10	
54	70	"	4	12	1		"	4	10	-4	
55	60	"	-6	6	13		"	-6	4	6	
56	69	"	3	9	19		"	3	7	10	
57	65	66	-1	8	28		"	-1	6	17	
58	66	67	-1	7	36	+	"	0	6	23	
59	57	67	-10	-3	43	+	66	-9	-3	29	
60	59	60	-1	-4	40		60	-1	-4	26	
61	48	50	-2	-6	36		50	-2	-6	22	
62	38	40	-2	-8	30		40	-2	-8	16	
63	30	30	0	-8	22		30	0	-8	8	
64	18	20	-2	-10	14		20	-2	-10	0	
65	16	10	6	-4	4		10	6	-4	-10	
66	4	0	4	0	0	E-0	0	4	0	-14	
67	0	0	0	0	0						

Example 3B—Note that revised center line crosses original center line at reverse point

Example 3-B

Example 3-B includes that portion of the curve shown in Example 3* from Station 32 to Station 45, using the same original ordinates, but the revised ordinates have been selected to change the direction of the common tangent of the pair of reverse curves at Station 45, and ordinates for a following reverse curve have been added, with the final station at Station 67. The revised ordinates for six stations (33 to 38 inclusive) have been increased by one unit each above those used in the solution of Example 3, from a value of 70 to a value of 71, and a somewhat lighter and longer spiral introduced—this being possible by the change in direction of the common tangent.

All the figures opposite Station 32 in Example 3 are copied opposite Station 32 in Example 3-B, and computation is carried forward to the reverse point, where an error of 12 in the sums column may not be too excessive, but a zero is desired in the half-throws column, as already explained. The error of positive 17 can be eliminated by increasing one ordinate 17 stations back, but that is too far back in this case, so the

*See installment No. IV of this series of articles—December issue, page 1281.

8th and 9th stations back are selected and each ordinate increased one point. The figures at Station 35 are repeated in the right-hand half of the slate and computation is carried forward to the reverse point again, where the error in the half-throws column has disappeared, and the error of 10 in the sums column seems about right.

Revised ordinates can now be selected for the second curve. They must total the same as the original ordinates plus the error of 10, which becomes —10 as it is carried across the reverse point. The values of the spiral ordinates are the same as those ahead of the reverse point, as already pointed out, and the final spiral is made as easy as possible or convenient. The remainder of the ordinates are made alike or as nearly so as possible. In this case they divide out to exactly 66.

When computations are made with these ordinates to the end of the curve, an error of —14 appears in the half-throws column, which must be eliminated. This can be done readily by reducing two ordinates by one unit each, and increasing two other ordinates, seven stations beyond, by a unit each. Stations 51 and 52 were reduced and Stations 58 and 59 increased by a unit each, and a final computation to the end of the curve shows that the error is eliminated and a solution of the entire curve is completed.

If the resulting throws are not considered excessive, and if they do not encroach upon the clearance to other tracks or to structures alongside the track, these can be used to set the stakes for the re-alinement. If any of them encroach on clearance, and the obstructions cannot be shifted readily, it will be necessary to change some of the ordinates so as to provide the necessary clearance, as shown in Example 3A.

Changes Back of Reverse Point

If excessive throws, or a final error in the half-throws column, cannot be eliminated between them and the reverse point and it is necessary to go back of the reverse point to make a change in an ordinate or ordinates, the change must be made in the opposite direction to what it would be if on the same side of the reverse, i.e., a correction of negative throws on one side of the reverse point would be made by a positive increase in the revised ordinates on the preceding side of the reverse point, and vice versa. This is a little confusing at first, but a few trials on the slate with the first trial opposite the revised trial will make it clear.

The half-throw at the reverse point does not have to be zero; in fact, it is often an advantage to have a small throw there in one direction or the other, either to fit the roadbed better or to simplify the elimination of the final error. In Example 3-B, the final error of —14 was eliminated by changing the ordinates at two pairs of stations, both of which were on the final curve.

1	2	3	4	5	6	7	8	9	10	11	12
Sta. Nos.	Orig. Ords.	Rev. Ords.	Diff.	Sums Diff.	Half Throws		Rev. Ords.	Diff.	Sums Diff.	Half Throws	
37	74	72	2	0	-4	OK	72	2	0	-4	
38	59	72	-13	-13	-4	+ +	72	-13	-13	-4	
39	68	66	2	-11	-17		66	2	-11	-17	
40	61	55	6	-5	-28		55	6	-5	-28	
41	45	44	1	-4	-33		44	1	-4	-33	
42	46	33	13	9	-37		33	13	9	-37	
43	25	22	3	12	-28		22	3	12	-28	
44	8	11	-3	9	-16		11	-3	9	-16	
45	0	0	0	9	-7	"PRC"	0	0	9	-7	
46	12	11	1	-8	-2		11	1	-8	-2	
47	25	22	3	-5	-10		22	3	-5	-10	
48	35	33	2	-3	-15		33	2	-3	-15	
49	50	44	6	3	-18		44	6	3	-18	
50	60	55	5	8	-15		55	5	8	-15	
51	64	66	-2	6	-7		66	-2	6	-7	
52	66	67	-1	5	-1	+	"	0	6	-1	
53	67	66	1	6	4		"	1	7	5	
54	70	"	4	10	10		66	4	11	12	
55	60	"	-6	4	20	+	67	-7	4	23	
56	69	"	3	7	24	+	67	2	6	27	
57	65	"	-1	6	31		66	-1	5	33	
58	66	"	0	6	37		66	0	5	38	
59	57	66	-9	-3	43	-	65	-8	-3	43	
60	59	60	-1	-4	40		60	-1	-4	40	
61	48	50	-2	-6	36		50	-2	-6	36	
62	38	40	-2	-8	30		40	-2	-8	30	
63	30	30	0	-8	22		30	0	-8	22	
64	18	20	-2	-10	14		20	-2	-10	14	
65	16	10	6	-4	4		10	6	-4	4	
66	4	0	4	0	0	E-O	0	4	0	0	
67	0	0	0	0	0		0	0	0	0	

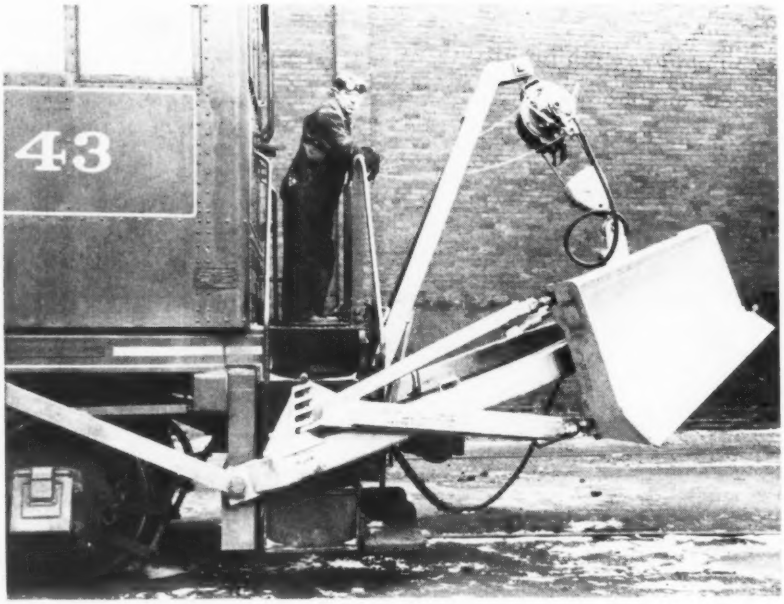
Two Solutions—Example 3C (Column 3 to Column 6) and Example 3D (Column 8 to Column 11)—involving a throw at the reverse point

Example 3-C

In Example 3-C, the final error of —14 is removed by ADDING to the ordinates at two stations exactly 14 stations apart, with the corrections on both sides of the reverse, and the last correction being 14 stations from the end of the curve. This gives the ordinate at Station 52 a value of 67, while the ordinates on each side of it have a value of 66. This is allowable, but example 3-D gives a better solution, i.e., two ordinates are selected 17 stations apart, making an over-correction of three units; then Station 56 is increased and Station 59 decreased by one unit each, thus correcting the error. Any of the above solutions is suitable; the best thing the one which fits the ground conditions most nearly with the least distortion of the revised curves and spirals.

If a list of the throws is to be sent to someone who is to set the stakes, the throws should be listed as "East" or "West" on a north and south railroad ("North or South" on a railroad running east and west) instead of "In" or "Out", as would be done on a curve without reversing. This will avoid any confusion at the reversing point.

If the computer draws a sketch of the curves, he will be able to change the positive and negative throws to "East" and "West" with no danger of having them staked in the wrong direction. He should have this sketch before him when inspecting his computations so he can see if his throws are excessive or in the wrong direction. A negative throw on one curve is in the same direction as a positive throw on the curve beyond the reverse point, and vice versa. Without such a sketch, the computer might well be confused himself, particularly if the original ordinates were recorded with the stations increasing in the opposite direction to the usual practice, as is often done for convenience or by design on multiple tracks, or for other reasons. Even if the computer were the recorder also, he still might be confused as to which of a series of curves he was working on. The principal thing is to make all instructions as plain as possible to avoid confusion on the part of the man setting the stakes.



Showing how blade appears when raised to clear switch stands or other obstructions

Diesel Switcher "Doubles" as Snow Plow

• Almost every year, the Buffalo Creek, in common with other roads in the Buffalo (N.Y.) area, is beset with major operating problems resulting from one or more heavy snowstorms that occur in that district during the winter months. These storms have reached blizzard proportions on some occasions, as in December, 1945, when three storms in as many days left more than 60 in. of snow. Lighter snowfalls in this area frequently present a considerable problem also because of drifting caused by the high winds that blow in from Lake Erie.

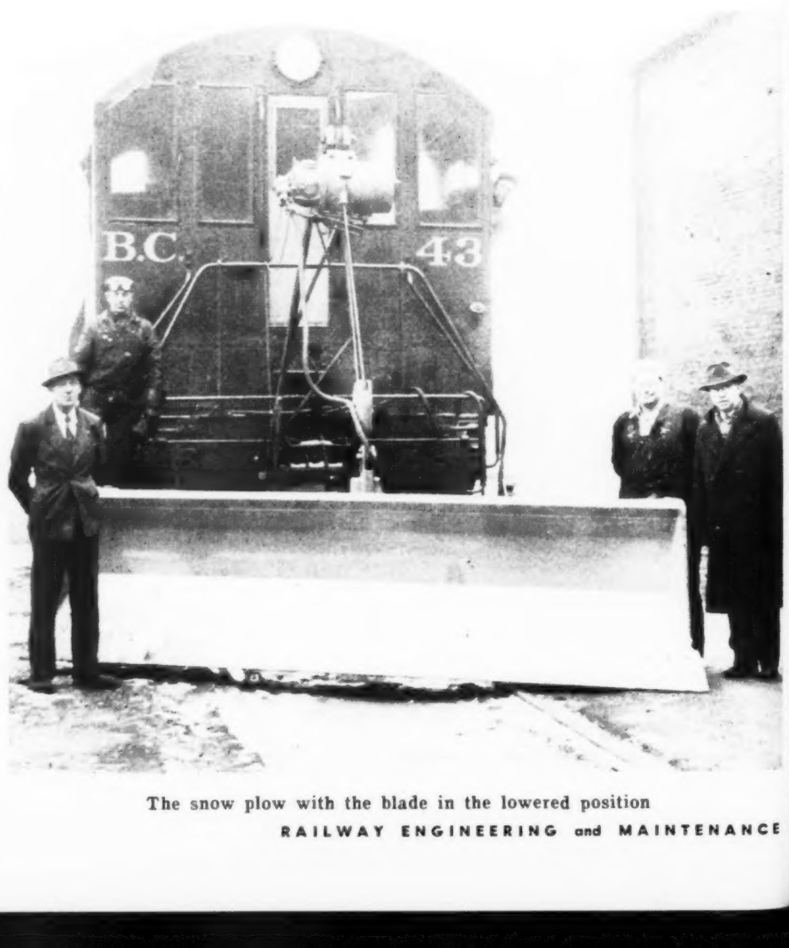
The Buffalo Creek has for many years felt the need of effective snow removal equipment but, because of the limited territory covered—5.73 mi. of line and 34 mi. of track—did not feel that the purchase of expensive equipment was justified. Recently, as a result of successful experience with tractor-mounted bulldozers in snow removal work, it has adapted one of its Alco 660-hp. Diesel switching locomotives for the effective handling of snow by the ready addition of a standard LeTourneau Model WC7 angledozer blade to the cab end of the locomotive. The resulting unit, it is said, will handle snow six feet deep.

The dozer blade is attached by means of two special frameworks. The blade and yoke are supported, through cables and a hoisting unit, from an A-frame boom mounted on the back casting of the locomotive coupler. The arms of the yoke are attached by means of bolts to a heavy pushing framework which is welded to the bed frame of the locomotive. An Ingersoll-Rand air-powered winch, operated from the train air line, provides the means of raising and lowering the blade as necessary.

The plow blade is 13 ft. wide and 39 in. high. It can be secured at right-angles to the track or angled 30 deg. to either the right or left. As already mentioned, the unit is reported to be capable of handling snow up to six feet deep, rolling it in front of the blade and throwing it clear of the track. The distance to which the snow is thrown is governed by the speed of the locomotive and the angle of the blade.

The plow attachment can be installed or removed in about 30 min., thus leaving the locomotive free for other work when not in snow-plow service. The unit weighs approximately 2,400 lb., and cost about $2,000 when built in 1946.

This snow plow attachment was developed by P. L. Sullivan, agent-engineer of the Buffalo Creek, in cooperation with the Rupp Equipment Company, Buffalo.



The snow plow with the blade in the lowered position

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems

Welding Rail Ends in Cold Weather

Can rail-end welding or end hardening be carried out during extremely cold weather without harmful effects to the rail or the quality of the result produced? If not, why? If so, how?

Temperatures Have No Effect

By R. W. TORBERT
Assistant to Vice-President, Oxweld Railroad Service Company, Chicago

Rail-end hardening and rail-end welding operations can be performed in extremely cold weather without any different effect on the rail than work done in moderate temperatures. The range of atmospheric temperatures as compared with heat-treating and welding temperatures is small and therefore has little, if any, effect on the results. Tests conducted in connection with the end hardening of rails at —100 deg. F. and at +175 deg. F. indicate no appreciable difference in the results obtained.

On the other hand, inclement weather presents a more serious problem. The quenching action of moisture, whether from rain or snow, affects the results, particularly in rail-end hardening operations. Work should not be done in such weather without some protection to avoid this quenching action.

To secure the most economical results in cold weather acetylene cylinders should be manifolded together to secure the maximum withdrawal from each cylinder. Many roads find it both practical and economical to continue both rail-end welding and rail-end hardening operations the year around.

No Temperature Failures

By TRACK SUPERVISOR

My observations of rail ends that have been welded in temperatures as low as —10 deg. F. have led me to conclude that low temperatures have little, if any, effect on the result obtained. I know of no cases in which failures of rails or welds could be attributed directly to the fact that the temperature had been below zero when the welding was performed.

Welding experts with whom I have discussed this all agreed that the temperature differential of varying weather conditions is so slight in comparison with the high temperatures reached in the welding process that it does not affect the metal while it is cooling.

On the other hand, very cold weather does affect the efficiency of the welding operation. Low temperatures bring on a bit of trouble with oxygen and acetylene regulators, which slows up the work. Some welders claim also to have experienced acetone carry-over in cold weather. This, if it occurs often, could become quite a nuisance. Most of these difficulties, however, can be minimized by manifolding more than the usual number of cylinders together.

The greatest possibility of obtaining defective work in welding operations carried out in very cold weather arises from the effect of the weather on the welders and other personnel involved. Their efficiency is lowered and their carefulness is likely to be reduced by very cold weather. The clothes they wear hinder the freedom of their movements to a point that may affect their dexterity in manipulating torches. Some welders have told me that they are generally conscious of having a tendency to overheat the rail in making welds in below-zero temperatures. These factors—more than the effect of the atmospheric temperature on the steel—tend to produce failures, if any, in welds that are made during periods of very cold weather.

Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the March Issue

1. *Should the slide plates of switches and spring-rail frogs be oiled? What are the advantages and disadvantages? How can any disadvantages be overcome? Explain.*

2. *What changes in methods and materials have occurred in recent years in flashing building roofs? Explain. How effective are they?*

3. *When switch heaters of various types are removed in the spring, how should they be cared for to insure their effective use another year? Does the type of heater make any difference? Explain.*

4. *When filling timber trestles, is there any advantage in removing the caps when removing the stringers? Any disadvantages? Why? How should it be done?*

5. *What is the best size of stone ballast to use under present-day conditions? What factors are involved?*

6. *To what extent are small standby water-treating facilities needed at outlying points to provide make-up water for Diesel-locomotives? Why?*

7. *In what effective ways can oil and grease be removed from enginehouse floors to reduce the hazard of slipping? Can any of these ways be used where oil and grease get on low-level station platforms? Explain.*

Ballast-Deck Wooden Trestles

Is it practicable to strengthen ballasted-deck wooden trestles in which the panels are longer than present-day standards allow? If so, how? What are the problems involved? Explain.

Problem Seldom Encountered

By J. P. DUNNAGAN
Engineer of Bridges, Southern Pacific, San Francisco, Cal.

We have many miles of trestle, but for 50 years or more our panel length has been 15 ft., which is still our present standard, so that we have not had any experience in strengthening trestles because of excessive length of panels.

On certain trestles, however, where the stringers have become weakened from one cause or another, we have put in reinforcing stringers alongside the old ones. In cases where this plan was not possible and there is no possibility of an excessive flow of water, a framed bent has been placed in the center of the panel, reducing it by one-half. This expedient, however, is only adopted where necessary and until a bridge gang is available for renewing the structure.

Two Methods Are Effective

By J. F. MARSH
Assistant Engineer of Bridges, Chicago, Rock Island & Pacific, Chicago

Some years ago we encountered considerable difficulty with the above problem by extending the use of heavy power over various parts of our system. In recent years, however, the expanding use of Diesel locomotives has tended to minimize the problem. We have employed two methods in strengthening existing ballasted-deck pile trestles where long panels have lowered the Cooper's rating below safe limits for engines with heavy axle concentrations.

The first method has been more or less of an experiment and, after several years' test, has proved satisfactory. This method consists of bolting a 3-in. by 8-in. creosoted plank to the bottom of each stringer which carries live load. These planks are secured to the stringers by means of heavy lag screws. In some cases Teco shear rings are also used. The planks are extended far enough from the center line of each span to develop strength beyond the point of live load and are similar to a bottom cover plate. In one or two installations where we used this method, we found that the deflection under heavy power was considerably reduced.

The second method is undoubtedly more satisfactory where old pile stubs still remain between existing bents. This method consists of sawing off the old stubs and constructing frame bents thereon up to the bottom of stringers. This method obstructs the waterway somewhat and its use is limited thereby. However, by shortening panel lengths by this method, when possible, the rating of a trestle can be increased.

Removing Snow from Platforms

To whom should fall the responsibility of keeping station platforms free of ice and snow? Why? Does the size or location of the station affect this responsibility?

Roadway Forces Responsible

By W. G. WHITE
Superintendent, Delaware, Lackawanna & Western, Hoboken, N. J.

The answer to this question is always bothersome as it is one that, in the final analysis, has to be determined by local conditions. Generally speaking, within commuter zones of large cities where the problem is particularly acute, I believe that the responsibility must be assumed by the roadway department.

Roadway-department forces engaged in this work must, of course, be augmented by whatever station forces are available, but the responsibility for seeing that the work is done should, in my estimation, be centered with the maintenance department. In this way, mechanized roadway equipment, including sweeper attachments and plows on jeeps, can be employed over a large part of the commuter zone in cleaning station platforms. This equipment, used during summer months in local roadway maintenance work, can be moved quickly from station to station either by truck or train, and in this way take care of a large number of station platforms with a minimum of equipment and forces.

Assign Tractor Sweepers

By R. P. JOHNS
Roadmaster, Chicago, Burlington & Quincy, Chicago

Preparations to handle snow and ice on station platforms should be made in the fall of the year, the exact time to be determined by the climatic conditions existing at the location in question.

Section forces, primarily, keep the platforms free of snow and ice at the majority of stations on the line, using shovels, brooms and salt. At such places passenger traffic is usually light, and platforms can be kept clean by hand methods for the infrequent arrival of passenger trains. It would be too expensive, and unnecessary, to use work equipment, such as tractors with brooms, at these locations.

Station platforms in densely populated suburban territory present a problem quite different from that at stations out on the line. Here, where the suburban traffic is heavy, it is necessary to keep the platforms clean at all times. To do this it is necessary for the track and bridge and buiding forces to unite, particularly during a heavy fall of snow. For this purpose tractors with snow brooms and plows should be placed at specific locations on the territory, with each tractor assigned to care for as many platforms as it can. In addition, either tractors or jeeps equipped with salt conveyors and salt spreaders should be placed at strategic places on the territory, because a spreading of salt will often keep the snow melted for many hours unless the temperature drops to the point where it is useless to use salt.

By having each tractor take care of three to six station platforms, depending on the distance between them and the accessibility of highways, the platforms can be kept clean much easier and much more economically than by a force of men with brooms and shovels.

The use of this equipment requires that men in the track department work in close conjunction with the work equipment forces. The machines must be ready to run at any time it starts snowing, and operators must be available. Also, an extra operator should be on hand to keep a constant check on the machines to assure their being ready to go when needed.

The size and location of the sta-

tion must be considered in determining what equipment to use and what men to assign to the work. At large terminals, all of the section forces are often kept busy keeping interlocking-plant and yard switches clean. Then it is necessary that the B & B forces be assigned the task of keeping platforms clean.

If a program is worked out to be used as a guide for each department and preparations made in advance for following it, the coming of winter should not find anyone unprepared.

Agent's Men Can Help

By ROADMASTER

The primary responsibility for removing snow and ice for *all* facilities rests on the roadmaster or other designated maintenance officer. However, it seems to me that there is a secondary responsibility resting on the station agency forces.

Snow storms are treated as an emergency and, as such, command that extra 10 per cent of effort of all employees. Being accustomed to emergencies, the track department steps in with all the force it can muster, for as long a period as is necessary. During such times, I am always struck by the almost universal "let-George-do-it" attitude of the station agents. With my men nearing exhaustion from long hours shoveling snow, agents will sometimes demand that we sweep off their platforms for each train.

There are two reasons why some station agents won't take on this work willingly. In the first place, being human, they don't want to do someone else's job, and the snow program has said that the roadway department is responsible for snow removal. In the second place, most of them are aware that if they do snow removal work with their own men, it is chargeable to Account 373, for which they are responsible, and not Account 272, for which the roadway department "toes the line".

In most cases the roadway forces should be, and are, willing to keep station platforms as clean and as safe as possible. In many cases, especially in terminal or suburban territory, agency forces would be inadequate. In such cases broader plans are usually made. However, if snow programs would only hint that the agent, at chosen points, had some responsibility in keeping platforms clean, and that he would not be a traitor to his cause if he helped out a little, I am sure that efficiency and safety would be improved at many stations.

Heating Fuel-Oil Storage Tanks

When should Diesel fuel-oil storage tanks be provided with heating coils? Why? Should steam or hot water be used for such heating purposes? Explain.

Heats Above-Ground Tanks

By L. B. CURTISS
Architect, Northern Pacific, St. Paul, Minn.

There is quite a divergence of opinion as to the advisability of providing heating coils for Diesel oil-storage tanks. A most important item to be considered in the design of fueling facilities is, of course, the total friction loss between storage tanks and the final point of discharge.

The accumulated loss of head, due to the passage of oil through pipe lines, valves, filters, nozzles, etc., varies with the viscosity of the oil. Also, many things enter into the consideration for each installation, such as winter weather conditions, distance of storage tank from pump house and from point of discharge, frequency of operation, and volume of oil that must be delivered.

Most of the oil purchased contains a varying amount of water and, in freezing weather, a heated tank permits the frequent draining of water from the bottom of the tank. It is our practice to provide all above-ground tanks with heating coils, thermostatically controlled. We believe that such an arrangement, under the severe weather conditions experienced in our territory, makes for more efficient and economical operation and permits the installation of smaller pumps and pipe lines than would otherwise be required. We also provide heating coils in the hose pits at the refueling platforms.

Steam is generally available at fueling locations from a not-too-distant supply and is to be preferred to hot water for the heating coils. For the same B.t.u. output, hot water would require approximately 50 per cent more pipe area than steam and, in case of pipe leakage, there would be a greater amount of water entering the tank. Furthermore, hot water is rarely available in sufficient quantities and it is not practical to pipe it for any distance.

Heating Coils Advisable

By OIL COMPANY OFFICER

Most of the Diesel fuels supplied to American railroads have a pour point of 0 deg. F. A number of the railroads operating in the northern part of the country have specifications requiring pour points varying from —15 deg. F. to —25 deg. F. During the past two years, when Diesel fuel has been short, these railroads have been unable to secure fuels meetings these specifications, but with the Diesel fuel-supply situation easing up to some extent, they are again insisting that the specifications be met. Some refiners have agreed to make special, low-pour-point fuels, but it is our opinion that this is not a satisfactory solution to the problem.

Many refiners will not be able to supply fuels with pour points of —15 to —25 deg. F. In certain parts of the country temperatures of —30 to —50 deg. F. are encountered during the winter months, and even fuel with a pour point as low as —25 deg. F. will cause trouble. Therefore, it is our recommendation that heating coils be supplied for all storage tanks where temperatures of below zero are common during the winter months. If proper installation is made, very little difficulty should be encountered from leakage but, of course, there should be an easy method to drain condensate from the fuel oil tank as the amount of condensate usually increases with a heating coil installation.

The question of whether to use hot water or steam depends almost entirely upon local conditions. In other words, the heating medium to be used will usually be dependent upon whether hot water or steam is available. In territories where low temperatures are encountered infrequently, it is sometimes feasible to supply steam to the storage tank from a spare switch engine. In extremely cold weather it may also be necessary to insert a portable heating coil in the fuel-oil tank car to assist in the unloading operation.

In addition to providing heating coils for storage tanks, it is necessary to equip the engine, fuel lines and filters with heat exchangers wherever Diesel locomotives are operating at very low temperatures. A heat exchanger is being manufactured for this purpose and a number of railroads have also built such pieces of equipment in their own shops.

There is one significant point pertaining to the discussion of handling Diesel fuel at low temperatures. Railroads which have been operating

Diesel equipment for a number of years in a cold climate encounter no difficulty with zero-pour-point Diesel fuel, even where temperatures drop as low as —50 deg. F. Through experience they have taken the necessary measures to handle the fuel properly. Most of the trouble encountered during the past two years has been on railroads with little or no experience in operating Diesel equipment.

Bunk Houses or Small Dwellings?

What are the relative merits of large bunk houses and small dwellings for the permanent housing of track labor or other railway employees at fixed points? Explain.

Small Dwellings Better

By H. J. McKENZIE
Chief Engineer, Southern Pacific Lines in Texas and Louisiana, Houston, Tex.

It is the studied and consolidated opinion of me and my division engineers that the merits of large bunk houses for housing railway employees are few as compared with the merits of small dwellings used for this purpose. There are three factors favoring large quarters: (1) The cost of construction is far less per room than in separate buildings; (2) less ground space is required for the large, multiple units; and (3) bunk houses are particularly adaptable to use by bachelors requiring only one room for living quarters.

These, however, are outranked by six reasons for building small dwellings: (1) A small house provides a home for an individual family; and family men are generally more permanent and dependable than unmarried workmen; (2) where families or individuals are housed in separate dwellings, they have more privacy, fewer quarrels, and take more interest in keeping their quarters clean and presentable; (3) sanitary facilities are usually provided for small dwellings, whereas several persons of varying habits may be required to use the same facilities in a multiple dwelling; (4) in case of fire, the loss could probably be confined to only one small dwelling, whereas there would be little chance of saving a large bunk house of frame construction; (5) where ground space is available, the small house will permit a separate yard, which induces the occupant to accept willingly more responsibility for keeping the site, as well as the house, in a clean, sanitary condition; and finally, (6) our experience has shown that it is not as difficult to obtain men where separate dwellings are furnished. Furthermore, the class of employees accepting such dwellings are more satisfactory in every respect. The housing shortage throughout the country has caused many men to accept railroad employment in order to obtain living quarters for themselves and their families.

There's a Need for Each

By DIVISION ENGINEER

The relative merits of large bunkhouses and small dwellings for the permanent housing of laborers depends largely on the location and, to some extent, on the purpose for which the housing is desired.

In terminal areas where a large force is required throughout the year—in summer for maintenance work and in winter for that and for snow fighting — large bunkhouses have a definite advantage. The labor obtained in such areas is, to a great extent, itinerant. It is doubtful if it will ever be otherwise. Bunkhouses are much more desirable for floating labor than individual dwellings, especially in city surroundings.

The small dwelling is best adapted to use for furnishing lodging to smaller groups in outlying territories. As such, it has an advantage of attracting the class of labor that might "take root", and thereby reduce the turnover. To be effective in this regard, however, the dwellings must be located where the need for laborers will be fairly constant. At this particular time this factor is especially important. A steady job and a place to live—particularly the latter—have an extremely strong influence on where a man works, and on how long he works there.

Neither bunkhouses nor small dwellings will likely displace camp cars for large roving extra gangs or house trailers for small gangs. But I would like to see more small dwellings established on sections on my division where local labor is scarce and the labor quota is constant but seldom filled. This might present certain problems, but they would certainly be secondary to the ones we now have, caused by a shortage of men.

Effect of Diesels on Line Changes

To what extent has the increasing use of Diesel locomotives reduced the need for curve and grade-reduction work? What are the factors involved?

Diesels Have Reduced Need

By H. B. BARRY
Chief Engineer, St. Louis-San Francisco, Springfield, Mo.

Based on the self-evident fact that tonnage can be most economically moved between any two given points on a perfectly straight and level track, it follows that any reduction in curve or grade must reflect some economy of operation, however intangible it might be.

In general, however, there must be other considerations and other savings to justify economically the expenditures necessary to carry out this type of work. Three of the more common reasons are: (1) To reduce excessive maintenance expenses on sharp curves; (2) to reduce loss and damage as a result of slack action in sharp sags; and (3) to make it possible to handle more tonnage at desirable speeds with the same power, and thus reduce train miles per gross ton of traffic.

It has been our experience that the Diesel-electric locomotive is much less destructive to the track structure on curves than the reciprocating-type steam locomotive and, to that end, there is less economic justification for curve revision for the purpose of reducing maintenance expense than obtains where reciprocal steam power is operated.

The usual result of the use of Diesel locomotives is to increase the tonnage and the lengths of trains. Consequently, slack action in a sag is not improved as a result of Diesel operation and it would not, therefore, be a governing factor in this type of grade change.

As a general thing, the prime reason for curve and grade reduction work comes under the heading of the third category. It is in this respect that the relatively great saving

resulting from reduction in train miles has heretofore justified some large expenditures for the type of work in question.

The use of Diesel-electric locomotives has made it possible to increase tonnage ratings, and at the same time maintain required speeds, to such a degree that in many places where curve and grade-reduction work was once contemplated, the expense involved can no longer be justified on an economic basis.

It would now appear that, to some extent, the question of economical train length will enter into the problem of determining whether curve and grade-reduction work is economically feasible. For example, if it were determined that it would not be economical to operate trains of more than 125 car lengths, and existing curve and grade conditions permitted operation of trains up to 125 cars in length at required speed with Diesel power, it would not be economically feasible to carry out any large curve or grade improvement projects.

In conclusion, I would say that the use of Diesel-electric locomotives has, at least, very definitely postponed many proposed curve and grade reduction projects.

Repairing Leaks in Built-Up Roofs

Where leaks occur in built-up roofs, how can such leaks be best located and patched? Are there practical or economical limits to such patching? Explain.

Inspection Basis For Cure

By ROOFING MANUFACTURER

Before going up on the roof to locate a leak, remember that stresses and strains affecting the lower parts of a structure may be causing the roof trouble. To save time it may be better to work from the ground up, examining the exterior walls, watching for cracks and signs of building movement, looking for dampness and checking all drainage facilities, such as downspouts. Then investigate the interior bearing partitions, noticing in particular lintels above doors and windows for cracks and signs of dampness that may indicate the location of the roof problem.

Finally inspect the underside of the roof deck for cracks below, that usually mean cracks above. On wood decks, rotted, curled or watermarked boards indicate trouble. On concrete decks, stains are a danger signal and rust spots usually mean rusted reinforcing rods due to leaks or condensation. On gypsum decks, spalling signals a leak. On steel decks, rusted clips or welds fastening the deck to purlins will frequently lead to the source of trouble.

With preliminary information derived from such inspections, it is usually necessary to spend far less time on the roof itself. And such information is particularly valuable on a tar-and-gravel, built-up roof, since the protecting gravel camouflages faults. Such "ground" work may lead directly to the weak spot. If not, go over the roof looking for open laps or broken felts. If there has been much foot traffic on the roof, the paths of travel may have worn through the felts.

If the roof has been in place for some time, the weather may have started deterioration. On a tar-and-gravel roof, the gravel may have washed away, leaving the felts exposed and disintegrating. On a rag-felt roof, the felts may be alligatored, indicating that the sun has drawn out and evaporated the asphalt, leaving the felts as dry and brittle as tissue paper. On a smooth-surface asbestos roof which has been in service a long time there may be areas of gray where the sun has bleached the surface coating of asphalt. This is not serious unless the felts are broken.

Carefully examine any previous patches, which are evidences of a former weakness. And, of course, any cracks are a sure sign of difficulty. Finally, if there is any rubbish on the roof, be sure to remove it and look carefully at that part of the roof that has been covered. Rubbish containing broken glass or boards with protruding nails can cause considerable damage.

Still another source of trouble may be a roof drainage system that is not functioning properly. Gutters that are filled or broken are possible sources of trouble. Other trouble spots are drains in the middle of the roof, which may be clogged or broken, or scuppers leading through parapets to downspouts.

Most important check points are the flashings on parapets, monitors, etc., which can cause leaks as frequently as roofing failures. Inspect the base and cap flashings of parapet walls carefully. Look for open joints in the parapet wall. Be sure the copings on parapets are well pointed. If there are exposed beams or firewalls, examine their waterproofing. Do the same with metal vents. If windows in monitors are not properly set and flashed, they can let in the weather. Also, be sure to notice the miscellaneous projections, such as pipes, ladder struts, guy wires, flag poles, bracings for signs, etc. If these have not been properly installed in a pitchpocket they can easily cause a great deal of grief.

Now, how should the repair work be accomplished? Blisters can be split open to release any entrapped moisture or air and then recemented. On a tar-and-gravel roof they must also be regraveled.

In patching worn spots, remove the damaged felts, clean the roof thoroughly; nail or spot mop the first ply of the patch and then mop solid the remaining plies. This is not too difficult on a smooth-surface roof, but patching a tar-and-gravel roof requires more care. The gravel must be spudded off first and, in so doing, care must be exercised not to damage the good felts. After cleaning, the patch is applied much the same as it would be on a smooth-surface roof, except that there is the additional operation of regraveling.

Cracks in the roof present one of the more serious repair jobs. Those that go through the roof deck indicate the need of an expansion joint since the building is apparently subject to movements, the effect of which can be overcome best by an expansion joint. If the cracks are less severe, or if caused by a permanent settling, applying a layer of insulation before reroofing may be the solution. Patching a crack is seldom the answer because it will be only a matter of time until the crack shows up again.

When the leaking roof is caused by defective portions of the drainage system, the offending gutters, drains, scuppers, downspouts, etc., must be rebuilt or reset properly. If the flashing is at fault, that which is broken should be removed and then replaced. To repair a broken metal flashing is quite a job. In such cases it may be better to use one of the available felt and asphalt methods of reflashing.

The practical or economical limits to patching are so varied that there is no reliable, over-all "rule of thumb" that can be used to define them. In general, if patching is a recurring job, the original roof must be pretty far gone, and if there are a multitude of patches to be made, applying an entirely new roof covering is frequently the money-saving course to take.

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 85)

EMBOSSED ALUMINUM BUILT-UP ROOFING

A BUILT-UP roofing consisting of sheets of commercially pure, annealed and soft-embossed aluminum, 0.004 in. thick, bonded together with asphalt, has been announced by the Reynolds Metals Company, Louisville, Ky. The material, it is said, can be used with any of the standard mopping asphalts on the market on any kind of roof deck, old or new. In its application no drastic changes in roofing methods are involved and no special skills are said to be required; the aluminum sheets simply replace the layers of felt commonly used on built-up roofs.

The material is available in 60-lb. rolls, each roll containing a sheet 36 in. wide by 360 ft. long. One roll, therefore, will cover approximately 10 squares of roof area. Each roll is marked to show side laps and staggered-layer center lines. To apply the material the roof deck is first covered with a layer of 30-lb. asphalt felt which is mopped with hot asphalt and topped with a layer of Reynolds embossed aluminum. The latter layer is then mopped with a layer of hot asphalt into which the top layer of aluminum is carefully broomed, completing the roof.

LIGHTWEIGHT GASOLINE ENGINE

THE Reed-Prentice Corporation, Worcester, Mass., is offering a compact, air-cooled, 2-cycle gasoline engine that developes 4 hp. at an engine speed of 4,500 r.p.m., has a 2-in. bore and 2-in. stroke, and weighs only 30 lb. It was designed for application to such portable units as saws, compressors, generators, pumps and conveyors.

Special features of the engine include parts made of die-cast aluminum; anti-friction bearings that protect all rotating parts from wear; a diaphragm carburetor that is said to assure a steady supply of fuel regardless of the position in which the engine is operating; and a passage in the crankcase and front cover which permits unburned fuel to return to the carburetor, eliminating, it is said, the danger of flooding or overloading the engine.

Applying a built-up roof of Reynolds embossed aluminum

The Reed-Prentice gasoline engine

SAFETY FLOOR COATING

THE Industrial Safety Products Division of the Watson-Standard Company, Pittsburgh, Pa., is now offering a new safety floor finish, known as Traffic-Tred, which is reported to have a high resistance to slipping, even when wet or greasy.

Traffic-Tred is an abrasive coating which is applied like paint and dries to a hard rough finish with a texture much like coarse sandpaper. It is reported to be suitable for use on steel, wood or concrete surfaces with equally satisfactory results, removing most of the danger from walking areas that are subject to water, grease or other slippery conditions. It is further claimed that the resistance to slipping is uniformly high with no apparent difference between dry, wet or oily surfaces. Other claims made for the product include satisfactory wear, easy cleaning and easy renewal or patching.

SNOW PLOW WAX

AN improved grade of Penn Drake Snow Plow Wax, suitable for spray as well as for brush application, has been announced by the Pennsylvania

For additional information on any of the products described on this page, use postcards, page 85

Refining Company, Cleveland, Ohio. When applied to plow blades and wings the wax forms a hard, smooth surface off which snow is said to slide easily.

The wax can be applied with an ordinary paint spray gun or with an ordinary paint brush. One gallon of wax is said to cover approximately 300 sq. ft. of working surface when applied by the former method and 250 sq. ft. when applied by brush. The temperature at the time of application should be above the freezing point and the surface should be dry. The plow blade can be placed in service shortly after it has been waxed.

Showing how Penn Drake Snow Plow Wax is applied with a paint spray gun

TIE PLATE SPACER

THE Woolery Machine Company, Minneapolis, Minn., is introducing a device designed to facilitate the positioning of either single or double-shoulder tie plates on the ties in connection with rail-laying operations. In this device one side of the unit rides the rail on two rollers which are restrained against lateral movement by five guide wheels, two of which ride the gage face of the rail head and three the opposite side of the head.

The other side of the device embodies an angle iron which slides longitudinally on one leg on top of the previously placed tie plates, and which acts as a gage bar or stop block against which the tie plate shoulders are positioned in their proper location. A special tool is provided for moving the tie plates against the gage bar. Adjustment of the gage bar to accommodate all sizes of rails and tie plates is accomplished by three turnbuckles. The two principal parts of the unit are joined by a steel frame on which is mounted two handles for pushing the device in either direction, one at each end. Weighing 112 lb., the unit can be lifted on or off the track by one man.

The Woolery tie plate spacer

PORTABLE PIPE BENDER

THE Electric Cord Company, New York, is introducing a new portable tool, known as the Lightweight Champ, for on-the-job pipe-bending operations, which is said to form smooth uniform bends, without wrinkles or fractures. The unit consists of an hydraulic jack, and a welded steel frame having a bearing plate for the base of the jack and holes for two bearing blocks or dies, one on each side of the jack. In the bending operation the pipe to be bent is placed against the bearing blocks and the force of the jack is applied to it at a point midway between the blocks. The dies are fitted on steel pins which, in turn, fit into the holes in the frame. The holes are arranged to allow four different spacings between dies, making possible an equivalent number of different pipe bend radii.

Bending a length of pipe with the portable pipe bender

The jack is removable and can be used for other purposes. The complete unit includes dies for pipe sizes

For additional information on any of the products described on this page, use postcards, page 85

ranging from ¾ in. to 2½ in. Special dies for bending other metal sections, such as rods, flat bars, hand rails, electric bus bars, etc., are available if desired. The combined weight of the jack and frame is 83 lb.

WELD FLUX CHIPPER

A NEW tool for chipping or peening welds has recently been introduced by the Chicago Pneumatic Tool Company, New York. Small in

The CP-455 Weld Flux Chipper being used to peen the weld on a tractor sprocket

size and light in weight, this tool is reported as being highly suitable for use in confined spaces, such as on the insides of small tanks.

The chief feature of this tool is a built-in jet blower device for use in keeping the work surface clear at all times. Also, a new type of pulley-valve control is said to result in smooth throttle action, making it possible to vary the force of the blow from a light tap to a heavy hammer stroke.

The chipper is designated as the CP-455. It is slightly more than ten inches long and weighs a little over four pounds. The tool is available with a lever-type or a push-type throttle, as desired. The equipment includes a chisel. In addition to chipping weld flux, the tool may be used for chipping paint, rust, scale, soot and dirt and for many other applications.

What Our Readers Think

AGREES WITH "POSITIVE APPROACH"

Montreal, Que.

To THE EDITOR:

I have read with considerable interest the editorial on page 1270 of the December issue of your magazine, entitled "Positive Approach." Commencing in 1944, any of our safety rule books that required reprinting have been changed as far as possible to incorporate the positive viewpoint. We have found that the matter of instructing and training new employees is simplified when they are directed in the way in which it is desired to have them work, rather than spending the time in issuing cautions as to the improper practices to avoid. I believe your suggestions should cause considerable interest and discussion on safety matters.

J. P. WADSWORTH
General Safety Supervisor
Canadian National

A SUPPLIER DISCUSSES "HOME-MADE" MACHINES

To THE EDITOR:

In my visits to railroad maintenance-of-way work equipment shops, I frequently find some device being developed by a mechanic to take the place of labor in track maintenance. In most cases, the tool or machine that the mechanic is working on has already been constructed by some manufacturer, and it frequently happens that he has built one and abandoned it because he found that it would not work satisfactorily and economically.

Railroad mechanics and maintenance officers seldom have a mechanical engineering background. Hence they do not figure the stresses of the members entering into a machine or device. Furthermore, not having a mechanical engineer available, they guess their gear ratios and speeds.

Still other disadvantages arise from the fact that the machines and devices built in this manner are usually constructed from worn-out parts and assemblies, and ordinarily any old engine available is used, regardless of the horsepower that is required. Frequently an attempt is made to modify a standard machine of some manufacturer to adapt it to another operation, and this often results in a cumbersome, crude machine.

To overcome these disadvantages, I suggest that any railroad contemplating the development of a new machine write one or more manufacturers fully about the job it wishes to do, describing the nature of the work to be done, stating the amount to be completed daily, weekly or monthly, giving if possible the cost of doing this work by hand, and presenting a general idea of the machine desired.

The manufacturer has mechanical engineers who could study the problem and prepare drawings for submission to the railroad company. After conferences of the manufacturer's mechanical engineers with representatives of the railroad company, work on the new machine could be started. Quite naturally, the manufacturer would know whether such a machine had already been developed, and also whether it had been patented. Moreover, he would be able to secure the necessary parts and assemblies for the machine, instead of having to use junk and scrap material found around a railroad shop.

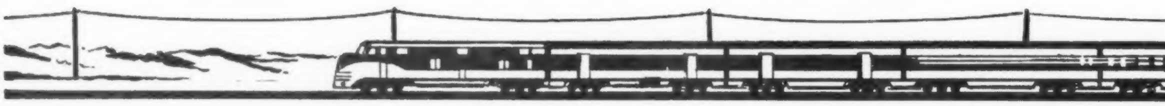
The most important advantages of having a manufacturer handle the design and construction of these experimental machines is that the railroad would have at its disposal all the engineering skill, experience, and "know how" of the manufacturer, as compared to the more limited knowledge and experience of its own personnel.

The procedure of developing a machine is often rather complicated. The manufacturer is accustomed to preparing drawing after drawing, conducting tests, making a search of the Patent Office for similar machines, and constructing experimental machines. When a machine is developed by an employee of a railroad company, he quite naturally spends time on this work instead of carrying out his regular duties. The machine he builds seldom works the first time, and further tests and experiments frequently require considerable periods of additional time on his part and on the part of other employees.

MANUFACTURER OF
MAINTENANCE MACHINES

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers



Changes in Railway Personnel

General

Robert D. Timpany, assistant engineer on the Indiana division of the New York Central System, at Indianapolis, Ind., has been appointed assistant trainmaster of the Ohio division, with headquarters at Springfield, Ohio.

B. S. Sines, vice-president of the Southern Pacific of Mexico, with headquarters at Guadalajara, Mex., and an engineer by training and experience, has been elected president of that company. A sketch of Mr. Sines' career appeared in the March, 1948, issue.

Harry C. Munson, assistant general manager of the Western Pacific at Chicago, and a former engineer, has been appointed assistant vice-president—operation, with headquarters at San Francisco, Cal.

C. E. Crippen, superintendent of the Minneapolis-St. Paul Terminals division of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Minneapolis, Minn., and formerly assistant engineer, system, has been promoted to general superintendent at Milwaukee, Wis.

Richard G. May, Jr., assistant superintendent of the New York Central's Grand Central Terminal in New York, and formerly in the maintenance of way department of that road, has been promoted to superintendent of the Mohawk and Hudson divisions, with headquarters at Albany, N.Y.

A. L. Snyder, assistant engineer on the New York, Chicago & St. Louis, with headquarters at Conneaut, Ohio, has been promoted to transportation engineer in the operating department, with headquarters at Bellevue, Ohio, succeeding **Howard B. Woodcock,** who becomes assistant trainmaster of the Lake Erie & Western district, at Muncie, Ind.

Richard E. Dougherty, vice-president—assistant to president of the New York Central at New York, and an engineer by training and experience, has retired after more than 46 years of service. **Boynton S. Voorhees,** assistant vice-president and former engineering assistant to vice-president, improvements and development, succeeds Mr. Dougherty.

Engineering

John W. Hopkins, engineer bridges and buildings of the Bessemer & Lake Erie, has been appointed engineer of track, succeeding **Herbert H. Harman,** who retired on November 30 after more than 45 years of service with this road. **William C. Howe,** designing engineer, has been appointed engineer bridges and buildings and **R. A. Ullery,** assistant engineer, has been appointed designing engineer. **D. T. Faries,** supervisor of track, has been appointed assistant engineer, succeeding Mr. Ullery. All of the above have their headquarters at Greenville, Pa.

John W. Hopkins

William C. Howe

Mr. Hopkins was born at Philadelphia Pa., on November 13, 1903, and attended Lehigh University and Pennsylvania State College, receiving a degree of B.S. in civil engineering from the latter institution in 1925. He was employed as draftsman, inspector and assistant engineer, successively, with James B. Long, Norristown, Pa., from 1925 to 1930. In the latter year he went with the Pennsylvania department of highways at Franklin, Pa., serving for six months as bridge designer and for five years as division bridge engineer. Entering railroad service in 1936 as designing engineer with the Bessemer & Lake Erie, Mr. Hopkin served as supervisor of track from June, 1939, to September, 1943, when he became principal assistant engineer. He was appointed engineer bridges and buildings in August, 1947.

Mr. Howe was born on May 24, 1908, at Juniata, Pa. He received a B.S. degree in civil engineering from Pennsylvania State College in 1930 and entered railroad service on May 17, 1937, as draftsman with the B. & L. E. at Greenville. He served in that position until 1945, when he became designing engineer at Greenville, which position he held until his recent appointment as engineer bridges and buildings.

Mr. Harman was born on November 28, 1878, at Muncy, Pa. He was graduated in 1902 from Thiel College and attended Cornell University. He entered railroad service on June 6, 1901, with the B. & L. E., becoming draftsman at Greenville in 1903. He was appointed engineer of bridges in 1906, which position he held until 1931, when he became engineer of track.

N. W. Kopp, assistant engineer of the Illinois Central, has been appointed assistant engineer of design, with headquarters at Chicago.

H. D. Stowe, assistant engineer in the office of the chief engineer maintenance of way of the New York zone of the Pennsylvania, with headquarters in New York, retired recently.

W. D. Almy, assistant division engineer and master carpenter of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., has been transferred, as assistant division engineer, to Baltimore, Md.

(Please turn to page 76)

Railway Personnel (Cont'd)

E. P. Wright, assistant to engineer of buildings of the Illinois Central, has been appointed special engineer with headquarters at Chicago.

H. H. Hall, division engineer on the Chicago & North Western, with headquarters at St. Paul, Minn., has been appointed assistant engineer at Chicago.

B. F. Keays, instrumentman on the Canadian National, with headquarters at Edmundston, N.B., has been promoted to assistant division engineer of the Moncton division at Moncton, N.B.

J. V. Johnston, acting assistant chief engineer, Southern region, of the Gulf, Mobile & Ohio, has been appointed assistant chief engineer, system, with headquarters as before at Mobile, Ala.

R. W. Davis has been appointed valuation engineer of the Texas-Mexican, with headquarters at Laredo, Tex. Mr. Davis was formerly president of the Rio Grand & Eagle Pass, operation of which has been discontinued.

Robert C. Caldwell has been appointed engineer of the Jacksonville Terminal, with headquarters at Jacksonville, Fla., succeeding the late **Harold D. Van Vranken.** Mr. Caldwell will have charge of the valuation, roadway, bridge and building, and signal departments.

S. E. Armstrong, engineer maintenance of way—system of the New York Central System, with headquarters at New York, retired on January 1, after 44 years' service.

Mr. Armstrong was born at Somerville, Mass., and received his education in the public schools of that city and at the Massachusetts Institute of Technology, Boston, Mass. He entered railroad service

S. E. Armstrong

with the New York Central in January, 1904, as a chainman at Buffalo, N.Y., being appointed assistant supervisor of track at Rochester, N.Y., in March, 1905. In August of the following year, Mr. Armstrong became assistant engineer at Buffalo, being transferred to Rochester in December, 1908. He was appointed assistant supervisor of track at the same point in 1911, and in 1913 he became acting supervisor of track at the same point, being promoted to supervisor of track at Richland, N.Y., in 1914. Three years later Mr. Armstrong was promoted to division engineer of the Ontario division at Oswego, N.Y., being transferred to the Pennsylvania division, with headquarters at Jersey Shore, Pa., in 1920, and thence to the River division, at Weehawken, N. J., in 1926. In September, 1927, he was further advanced to engineer of standards of the New York Central System, with headquarters at New York, and was promoted to engineer maintenance of way—system on November 1, 1940.

Herbert E. Womack, whose appointment as division engineer on the Southern division of the Chicago, Rock Island & Pacific, with headquarters at Fort Worth, Tex., was noted in the December issue, was born on January 2, 1907, at Southwest City, Mo., and was graduated from the University of Missouri in 1931 with a Bachelor of Science degree in engineering.

Herbert E. Womack

He began his railroad career in June, 1936, as a rodman on the Rock Island at Des Moines, Iowa, subsequently serving as bridge inspector and instrumentman at various points until April, 1947, when he was appointed assistant engineer. He was serving in this capacity at Fort Worth at the time of his recent promotion to division engineer.

Benjamin Chappell, engineer of track of the Western region of the Canadian National, has been appointed district engineer of the Manitoba district, with headquarters as before at Winnipeg, Man., succeeding **N. M. Waddell,** who died recently.

P. G. Mattern, has been appointed assistant valuation engineer of the Pennsylvania, with headquarters at Philadelphia, Pa., succeeding **Spencer Danby,** whose promotion to valuation engineer was announced in the November issue.

Wyatt E. Simpson, assistant engineer on the Arkansas division of the Chicago, Rock Island & Pacific at Little Rock, Ark., has been promoted to division engineer of the Chicago Terminal division, with headquarters at Chicago, succeeding **T. P. Warren,** who has retired.

R. L. Mays, whose appointment as division engineer of the New York, Chicago & St. Louis at Frankfort, Ind., was

R. L. Mays

reported in the December issue, was born on January 22, 1904, at New Castle, Ky., and attended the University of Kentucky, receiving a Bachelor of Science degree in civil engineering from that school in 1925, and a Civil Engineer degree in 1930. Mr. Mays entered the service of the Nickel Plate in April, 1928, as a structural designer at Cleveland, Ohio, and in February, 1940, was appointed assistant engineer at Fort Wayne, Ind. A short time later he was appointed assistant division engineer at that point, serving in that capacity until August, 1942, when he became assistant supervisor of bridges and buildings at Frankfort. Mr. Mays was advanced to designing engineer at Cleveland in October, 1942, and was holding this position at the time of his recent promotion.

W. I. King, crossing engineer on the Norfolk & Western, with headquarters at Roanoke, Va., has been promoted to assistant engineer at Portsmouth, Ohio, to succeed **W. H. Bettis,** whose death is reported elsewhere in these columns. **J. S. Felton, Jr.,** resident engineer at Norfolk, Va., has been appointed crossing engineer, succeeding Mr. King at Roanoke.

A. E. Haywood, assistant engineer in the engineering department of the Grand Trunk, has been appointed assistant engineer in the maintenance of way department, with headquarters as before at Battle Creek, Mich. **G. Lichtenwolner** has been appointed acting assistant engineer in the engineering department at Battle Creek.

H. F. Busch, division engineer of the St. Louis-San Francisco at Memphis, Tenn., has been transferred to Yale, Tenn., where he will have jurisdiction over the Willow Springs, Memphis and Tupelo subdivision of the Southern division and the Memphis terminal. **G. L. Harris,** division roadmaster at Armory, Miss., has been advanced to division engineer, also with headquarters at Yale, with jurisdiction over the Birmingham, Columbus and Pensacola subdivisions of the Southern division and the Birmingham terminal.

(Please turn to page 78)

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★STANDARD FOR QUALITY AND PRECISION

Railway Personnel (Cont'd)

C. W. Breed, engineer of standards for the Chicago, Burlington & Quincy at Chicago, has retired following 50 years of railroad service. Born on December 17, 1878, at Quincy, Ill., Mr. Breed received his technical education at Armour Institute and joined the Burlington in 1898 to work on track elevation. Except for two years of army duty during World War I and two years' service with the Chicago Car Service Association, Mr. Breed's entire career has been spent with the Burlington. He served successively as rodman, draftsman, chief draftsman, office engineer and engineer of standards, having held the latter post since February 1, 1943.

W. N. Myers, whose promotion to division engineer of the Indianapolis division of the Pennsylvania, with headquarters at Indianapolis, Ind., was announced in the December issue, was born on June 6, 1912, at Cumberland, Md., and was graduated from Johns Hopkins University in 1933. He entered the service of the Pennsylvania in July, 1934, as an assistant on the engineer corps at Cleveland, Ohio. From April, 1936, to September, 1939, he served as assistant supervisor of track at various locations, being promoted to supervisor of track on the latter date, with headquarters at New Castle, Pa., and was transferred to Huntingdon, Pa., in November, 1943. He was promoted to assistant division engineer of the Philadelphia division in April, 1948, and held that position at the time of his recent promotion.

B. M. Stephens, architectural engineer of the Texas & New Orleans (part of the Southern Pacific System), with headquarters at Houston, Tex., has been promoted to assistant to chief engineer, with the same headquarters, succeeding **L. A. Loggins,** who has been promoted to assistant chief engineer at that point. **C. E. Helmle,** bridge and building supervisor at Houston, has been promoted to senior assistant engineer of the Houston division, replacing **B. F. Biaggini,** who, in turn, has been appointed senior assistant engineer, system, succeeding **J. N. Fuller,** who has been promoted to principal assistant engineer. **R. B. Carruthers,** bridge engineer at Houston, has been advanced to assistant supervisor of structures, and **J. M. Lowry,** bridge and building inspector, has been appointed bridge engineer and inspector. **H. H. Blair,** chief draftsman, has been promoted to chief draftsman and architectural engineer.

Claude Johnston, whose promotion to assistant division engineer of the Pensacola division of the Louisville & Nashville, with headquarters at Mobile, Ala., was announced in the September issue, was born at Lexington, Ky., on August 21, 1912. He attended the University of Kentucky, from which he graduated in 1936, receiving a B.S. degree in civil engineering. He entered the service of the L. & N. on March 4, 1940, as a rodman on the Evansville division, later serving as instrumentman on the Birmingham and the Cumberland Valley divisions and as architectural draftsman in the office of the chief engineer, at Louisville, Ky. He was furloughed for military service in December, 1942, and served as a first lieutenant in the Military Railway Service in Italy. On returning to the L. & N. in August, 1946, as a draftsman, Mr. Johnston soon became assistant engineer and later became resident engineer, with headquarters at Pascagoula, Miss., the position he held at the time of his recent promotion.

H. A. Fuller, office engineer of the Atlantic region of the Canadian National, has been promoted to assistant engineer maintenance of way, with headquarters as before at Moncton, N.B. **E. C. Matthews,** assistant engineer (track) of the Atlantic region, has been promoted to division engineer of the Edmundston division, with headquarters at Edmundston, N.B., succeeding **J. F. MacKenzie,** whose death is announced elsewhere in these columns. **H. A. Bowdon,** assistant engineer at Edmonton, Alta., retired recently after 29 years' service. **R. F. MacKenzie,** instrumentman, has been promoted to assistant division engineer of the Campbellton division, with headquarters as before at Campbellton, N.B.

Mr. Fuller was born at Farnham, Que., and entered the service of the C.N.R. as a draftsman at Truro, N.S., in 1913 and later served as transitman and instrumentman at Cochrane, Ont. He was furloughed for military service during World War I and, on returning to the C.N.R., was assigned as transitman at Bridgewater, N.S., being promoted to senior instrumentman in 1919. Mr. Fuller was transferred to Halifax in 1923 and, in 1927, was promoted to third assistant engineer in the regional headquarters in Moncton. Later in 1927 he became second assistant engineer and was promoted to acting assistant engineer maintenance of way in 1941. He became office engineer in 1942 and held that position until his recent promotion.

Joseph A. Jorlett, whose promotion to assistant engineer in the office of the chief engineer, New York zone, of the Pennsylvania was announced in the October issue, was born in Clifton, N. J., on March 28, 1904. He attended Rutgers University between 1921 and 1924 and later studied civil engineering at New York University between 1926 and 1929. He entered the service of the Pennsylvania in July, 1929, and was assigned to the office of the division engineer of the New York division at Jersey City, N. J., remaining there until 1934, when he became a construction foreman on the electrification of the New York division. He left railway service in 1935 to serve as construction superintendent for the U. S. Resettlement Administration, but returned to the railroad in 1939 as assistant bridge and building foreman on the New York division. Mr. Jorlett left railway service for a brief period in 1938, during which time he served as engineer in heavy construction work. On returning to the Pennsylvania, he was assigned as assistant master carpenter in the office of the chief engineer, Philadelphia, Pa., remaining there until 1942, when he was promoted to master carpenter of the Conemaugh division, with headquarters at Pittsburgh, Pa., the position he held at the time of his recent promotion.

Track

R. E. Dennis has been appointed roadmaster of the Canadian National with headquarters at Brandon, Man.

J. W. Read, assistant supervisor track of the Bessemer & Lake Erie, with headquarters at Greenville, Pa., has been promoted to supervisor of track, with the same headquarters, succeeding **D. T. Faries,** whose promotion to assistant engineer is noted elsewhere in these columns.

L. E. Hardin, assistant roadmaster on the Seaboard Air Line at Savannah, Ga., has been promoted to roadmaster at Tampa, Fla., with jurisdiction over the Coleman-Gary line, succeeding **D. B. Neel,** who has been transferred to Montgomery, Ala., with jurisdiction over the line between Montgomery and Columbus, Ga.

Howard S. Chandler, recently promoted to general supervisor of track on the Chesapeake & Ohio, with headquarters at Richmond, Va., as noted in the November issue, was born at Keswick, Va., on February 6, 1892. He entered the service of the C. & O. on September 26, 1915, as a track laborer and was promoted to track foreman on December 26, 1916. He became cost engineer on January 1, 1929, and was appointed supervisor of track, at Richmond, on July 1 of that year, later becoming general track inspector, the position he held at the time of his recent promotion.

D. A. Sempsrott, assistant supervisor of track on the Panhandle division of the Pennsylvania, with headquarters at Coshocton, Ohio, has been promoted to supervisor of track at Wheeling, W. Va., also on the Panhandle division, succeeding **T. C. Netherton,** who has been transferred to the Wilkes-Barre division at Reading, Pa., as noted in the December issue. **Allan Cywin,** junior engineer on the Long Island, at Jamaica, N. Y., has been appointed branch-line assistant supervisor on the New York division of the Pennsylvania, with headquarters at Jamesburg, N. J., to succeed **J. H. Burdakin,** who has been transferred to the main line of the Panhandle division, at Coshocton, replacing Mr. Sempsrott.

Edward Wollett, Jr., supervisor of track on the Cincinnati division, at Cincinnati, Ohio, has been transferred to Crestline, Ohio, on the Ft. Wayne division, where he replaces **W. R. Catching,** who has been moved to the Monongahela division, with headquarters at Homestead, Pa., succeeding **W. G. Goellner,** who, in turn, succeeds Mr. Wollett at Cincinnati.

(Please turn to page 80)

For additional information, use postcard, pages 85-86

Railway Personnel (Cont'd)

W. P. Nichols, who has been promoted to general supervisor of track of the Chesapeake & Ohio, with headquarters at Huntington, W. Va., as announced in the November issue, was born at Blowing Rock, N. C., on June 30, 1893. He entered the service of the C. & O. on May 6, 1912, as a section laborer serving later as extra force foreman and section foreman. In May, 1920, he was appointed supervisor of track and in 1944 was further advanced to general inspector of track, which position he was holding at the time of his recent promotion.

P. W. Shenefield, whose promotion to supervisor of track on the Columbus Terminal district of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, was announced in the November issue, was born at Langsville, Ohio, on November 29, 1906. He entered railway service in March, 1926, as a track laborer on the Hocking Valley (now part of the C. & O.), serving in this capacity until 1937, when he became an assistant foreman and, later, foreman. Mr. Shenefield was promoted to rodman at Columbus in 1941 and, during the next three years, studied engineering in night courses at Ohio State university. He became ballast inspector in 1943 and assistant cost engineer in 1945, serving in the latter capacity until 1946, when he became assistant supervisor of track at Marion, Ohio, the position he held at the time of his recent promotion.

Bridge and Building

L. W. Kennedy, has been appointed bridge and building master on the Bruce division of the Canadian Pacific, with headquarters at Toronto, Ont.

Leon E. Loper, has been appointed assistant master carpenter of the Delaware, Susquehanna and Tioga divisions of the Erie, succeeding **Burt L. Butts,** who has retired because of ill health.

J. F. Scheumack, structural draftsman in the office of chief engineer of the Texas & New Orleans (part of the Southern Pacific System), has been promoted to assistant bridge and building supervisor of the Houston division, with headquarters at Houston, Tex., succeeding **R. F. Reese,** who has been advanced to bridge and building supervisor at Houston, in place of **C. E. Helmle,** whose appointment as senior assistant engineer is noted elsewhere in these columns.

Vester D. Raessler, whose promotion to supervisor of bridges and buildings on the Illinois Central, with headquarters at Memphis, Tenn., was reported in the December issue, began his railroad career in September, 1925, as a bridge and building carpenter on the I.C. at Cherokee, Iowa. He subsequently advanced through the positions of bridge and building foreman and general bridge and building foreman until September, 1942, when he was furloughed for service in the army. During his service overseas with the Military Railway Service, Mr. Raessler was decorated with the Croix de Guerre. He was discharged from the army in November, 1945, with the rank of captain, and returned to the Illinois Central as general bridge and building foreman at Waterloo, Iowa. In June, 1948, he was transferred to Memphis, where he was stationed at the time of his recent promotion.

Julius J. Brandimarte, whose promotion to master carpenter of the Erie & Ashtabula division of the Pennsylvania, with headquarters at New Castle, Pa., was announced in the December issue, was born at Gallitzin, Pa., on January 22, 1918. He first entered the service of the Pennsylvania in 1936, working as a track laborer on the Pittsburgh division during summer vacation, and continued to serve in this capacity each summer until his graduation from Purdue university in 1940, after which he became a bridge and building apprentice on the Panhandle division at Steubenville, Ohio. He was inducted into the army in 1941 and, after attending officers candidate school, was commissioned a second lieutenant in the corps of engineers, from which he was discharged with the rank of captain. Mr. Brandimarte returned to the Pennsylvania in February, 1946, as assistant master carpenter of the Philadelphia division, with headquarters at Harrisburg, Pa., the position he held at the time of his recent promotion.

Special

C. J. Brightwell, recently promoted to supervisor of work equipment of the Chesapeake & Ohio, with headquarters at Huntington, W. Va., as noted in the December issue, was born at Talcott, W. Va., on April 27, 1896, and entered the service of the C. & O. as an apprentice machinist in the Huntington shops on July 17, 1912. In July, 1917, he left the mechanical department to become a road mechanic in the maintenance of way department, and was holding that position at the time of his recent promotion.

Obituary

N. M. Waddell, district engineer of the Manitoba district of the Canadian National, with headquarters at Winnipeg, Man., died recently.

W. H. Bettis, assistant engineer on the Norfolk & Western, with headquarters at Portsmouth, Ohio, died recently in that city after a brief illness.

J. F. MacKenzie, division engineer on the Canadian National, with headquarters at Edmundston, N.B., died suddenly at Edmundston on October 18. He was 64 years of age.

M. W. Brown, assistant cost engineer in the valuation department of the Erie, with headquarters at Cleveland, Ohio, died suddenly in his office on October 29.

I. S. Youngblood, retired bridge and building supervisor of the Central of Georgia died suddenly at Millen, Ga., on November 9. He was 73 years of age.

Association News

Bridge and Building Association

The Executive committee of the association met in Chicago on December 6 to pass on association matters and take action upon many new applications for membership. The principal purpose of the meeting, however, was the selection of the personnel of the technical committees for the current year.

Railway Supply Groups Plan March Exhibit

As noted in the feature pages of this issue, the National Railway Appliances Association is looking forward to one of its largest exhibits in history, in Chicago, on March 14-17, in connection with the Golden Anniversary Convention of the American Railway Engineering Association. Both the Track and Supply Association and the Bridge & Building Supply Men's Association have accepted an invitation of the N.R.A.A. to display their banners and membership lists at the exhibit, in joint recognition by the industry of the important occasion being celebrated by the A.R.E.A.

(Please turn to page 82)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 15-17, 1949, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual Convention April 26-28, 1949, St. Louis, Mo. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, January 24, 1949. E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—John S. Vreeland, secretary, 30 Church street, New York.

National Railway Appliance Association—Annual exhibit, Chicago, March 14-17, 1949, in connection with the A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Railway Tie Association—Annual convention, September 12-14, 1949, Peabody Hotel, Memphis, Tenn. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

Association News (Cont'd)

Railway Tie Association

J. R. Keig, manager, tie department, of the Kirby Lumber Company, Beaumont, Tex., has been elected a member of the Executive committee of the association, to fill a vacancy.

Maintenance of Way Club of Chicago

The next meeting of the club will be held on January 24, and will be featured by an address by F. R. Layng, consulting engineer, Bessemer & Lake Erie, Greenville, Pa., who will speak on the Relationship Between Material and Labor in Track Maintenance. The meeting, which will begin with a reception at 6:00 p.m., will be held in Eitel's restaurant in the Field Building, Clark and Adams streets.

The December 13 meeting of the club, with an attendance of 180, was addressed by J. P. Datesman, engineer of track, Chicago & North Western, who spoke on The Maintenance of High-Speed Track. An abstract of Mr. Datesman's address appears in the feature pages of this issue.

Metropolitan Maintenance of Way Club

The December meeting of the club, with 115 railway men and 73 supply men attending, was the largest yet to be held by this organization. As in the past, this was a luncheon meeting, preceding the annual dinner of the New York Railroad Club. J. M. Fox, assistant to the chief engineer of the Eastern region of the Pennsylvania, was the principal speaker. His talk, entitled Becoming Machinery Minded, dealt primarily with the savings which can be effected by the use of power tools and work equipment in maintenance of way work and was followed by an active discussion from the floor.

The next meeting will be held in the Skyline room of the Hotel Sheraton, New York, on February 24. L. L. Adams, assistant chief engineer, Louisville & Nashville, will tell of recent experiences of his road with hurricane damage in the Gulf Coast area. His talk will be illustrated with slides.

American Railway Engineering Association

Nominations for the annual election of officers of the Association have been announced. In line with usual practice this election will be held by letter ballot. The nominations are as follows:

President, F. S. Schwinn, assistant chief engineer, Missouri Pacific Lines, Houston, Tex.; vice-president, H. S. Loeffler, assistant chief engineer, Great Northern, St. Paul, Minn.; directors (four to be elected), A. B. Chapman, assistant chief engineer, Lines East, Chicago, Milwaukee, St. Paul & Pacific, Chicago; E. J. Brown, engineer of track, Burlington Lines, Chicago; N. D. Howard, editor, *Railway Engineering & Main-*

tenance, Chicago; I. H. Schram, chief engineer, Erie, Cleveland, Ohio; A. B. Stone, chief engineer, Norfolk & Western, Roanoke, Va.; G. W. Miller, assistant engineer maintenance of way, Canadian Pacific, Toronto, Ont.; P. O. Ferris, chief engineer, Delaware & Hudson, Albany, N. Y.; and C. B. Bronson, assistant engineer maintenance of way, New York Central System, New York.

For members of the Nominating Committee (five to be elected): J. C. Aker, chief engineer, Nashville, Chattanooga & St. Louis, Nashville, Tenn.; F. H. Simpson, engineer maintenance of way, New York Central System, Chicago; B. R. Meyers, assistant chief engineer, Chicago & North Western, Chicago; R. P. Hart, chief engineer, Missouri Pacific, St. Louis, Mo.; W. E. Cornell, engineer of track, New York, Chicago & St. Louis, Cleveland, Ohio; H. L. Restall, valuation engineer, Boston & Maine, Boston, Mass.; E. S. Birkenwald, engineer of bridges, Southern, Cincinnati, Ohio; Ray McBrian, engineer standards and research, Denver & Rio Grande Western, Denver, Colo.; A. N. Laird, chief engineer, Grand Trunk Western, Detroit, Mich.; and G. M. O'Rourke, assistant engineer maintenance of way, Illinois Central, Chicago.

In addition to the above names to be balloted on G. L. Sitton, assistant chief engineer, Southern System, Washington, D. C., will automatically be advanced from junior vice-president to senior vice-president.

Four committees have scheduled their meetings to be held in January. The Committee on Wood Bridges and Trestles will meet at the association's headquarters in Chicago on January 6; the Committee on Records and Accounts will hold a meeting at the Engineers' Club at Chicago on January 19; the Committee on Masonry will meet at the Tutwiler hotel, Birmingham, Ala., on January 20-21; and the Committee on Economics of Railway Location and Operation will meet at the Engineers' Club, Chicago, on January 25.

The January bulletin (No. 478) containing all the remaining committee reports but four will be mailed to members during the second week in January. The secretary's office has mailed cards to all members (except those in the Chicago area), which may be used for making hotel reservations for use during the convention in March. Members are being urged to make their reservations early and to plan on being in Chicago on Monday, March 14, so that they will have an opportunity to view the manufacturers' exhibit at the Coliseum.

Supply Trade News

General

The Chicago railroad sales office of the **Buda Company,** formerly located at 35 East Wacker drive, has been moved to Harvey, Ill., telephone Interocean 8-9530.

The **Equipment Research Corporation,** 64 East Jackson boulevard, Chicago, of which **J. A. Amos** was recently elected president, has been appointed exclusive railroad sales agents for the products of **Mines Equipment Company,** St. Louis, Mo.

The manufacturing and distributing activities of the **Ransome Machinery Company** will now be conducted by the parent company, **Worthington Pump & Machinery Corporation,** at Worthington's Dunellen Works, Dunellen, N. J., the location formerly used by the Ransome Company. Sales activities will be directed from Worthington's executive offices at Harrison, N. J.

The trustees of the **James F. Lincoln Arc-Welding Foundation** have sponsored a new award program—"Welded Bridges of the Future"—to advance the progress of welded bridge design. The program offers awards to bridge or structural engineers for the best designs for a specified welded highway bridge. The first award will be $3,000, the second $1,500, and the third $750. In addition, there will also be 10 honorable-mention awards of $100 each. The competition will close June 30, 1949. Any engineer or designer who feels himself qualified is eligible for participation.

The bridge to be designed is a two-lane highway bridge, supported on two end piers 120 ft. apart, and is to be designed for ASTM-A7-46 steel and for H20-44 loading. Apart from these specifications, the designer is completely free to exercise his ingenuity. The Rules committee and jury of award is under the direction and chairmanship of **Wilbur M. Wilson,** research professor of structural engineering, University of Illinois. Complete details of the rules and conditions of the program are available in a printed brochure which can be secured from the James F. Lincoln Arc-Welding Foundation, Cleveland 1, Ohio.

Personal

The **Syntron Company,** Homer City, Pa., has announced the appointment of **Mark Chisholm** as district sales manager of its newly-established sales office in Des Moines, Iowa. **Ernest K. Hood** has been appointed district sales manager of a new sales office in Kansas City, Mo., and **R. K. Bentzien** has been placed in charge of power tool and paper jogger sales at Milwaukee, Wis.

(*Please turn to page* 88)

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

For additional information, use postcard, pages 85-86

Supply Trade News (Cont'd)

H. N. O'Neil has been appointed western sales manager of the Lehigh Portland Cement Company, with headquarters at Chicago.

Robert T. Maynard, district sales manager of the **Thew Shovel Company,** with headquarters at Washington, D. C., has been advanced to the position of export manager.

The **Caterpillar Tractor Company,** Peoria, Illinois, has announced the appointment of three new asistant divisional parts managers. These are **T. A. Dunne,** who will serve in the Eastern division; **J. E. Ferguson** in the Central division; and **W. R. Owens** in the Western division.

R. G. LeTourneau, Inc., Peoria, Ill., has announced the appointment of **Hans A. Bohuslav** as special engineering consultant to the president. Mr. Bohuslav was formerly vice-president in charge of engineering and production for Engineering Controls, Inc., Los Angeles, Cal.

William J. McGraw, formerly manager of electric tool sales in the New York territory, has been appointed manager of the Cleveland, Ohio, branch of the **Independent Pneumatic Tool Company,** Aurora, Ill., and **E. B. Rosell,** formerly electric tool service engineer in the Chicago branch territory, has been appointed to succeed Mr. McGraw.

The **Chain Belt Company,** Milwaukee, Wis., has announced the establishment of a new warehouse at 878 Ashby street, N.W., Atlanta, Ga. The Atlanta district office will also be located at this address and will be under the direction of **J. S. Moore,** district manager. The new warehouse, which will be under the supervision of **G. J. Schuelke,** will serve the states of North Carolina, South Carolina, Virginia, Georgia, Florida and Alabama.

Dearborn Chemical Company, Chicago, has announced the addition of **P. M. Miller** to the engineering and research staff of its Railroad department. Mr. Miller is a graduate of Rensselaer Polytechnic Institute, having received a degree in chemical engineering from that college in 1935, and a master's degree in geological water research in 1936. Prior to joining Dearborn, Mr. Miller was a chemist and water inspector on the New York Central.

G. O. Britton, asistant domestic sales manager of the **Athey Products Corporation,** Chicago, has been promoted to domestic sales manager, and **E. B. Schlenk** has been appointed district representative. Mr. Britton has had many years of experience in the farm implement industry, and prior to joining the Athey Company in May, 1948, was sales manager of Kaiser-Frazer Farm Implement division.

Mr. Schlenk was formerly connected with S. C. Johnson & Son, Inc., and the Roy C. Whayne Supply Company, Inc. As district representative for Athey, he will take over the company's central territory.

Rudolph R. Kopfmann, formerly manager of research and promotion of Associated Business Papers, has joined the eastern advertising sales staff of the **Simmons-Boardman Publishing Corporation.** Mr. Kopfmann will represent all Simmons-Boardman transportation periodicals — *Railway Engineering and Maintenance, Railway Age, Railway Mechanical Engineer, Railway Signaling and Communications*, and *Marine Engineering and Shipping Review*. He will also be available to continue in an advisory capacity his previous work with the Associated Business Papers promotion committee, of which **J. S. Crane,** vice-president and secretary of **Simmons-Boardman,** is chairman.

Rudolph R. Kopfmann

Mr. Kopfmann was born at New York on August 31, 1917. He studied advertising and selling at Pace Institute and New York University, and began his business career with the Public National Bank & Trust Co. of New York. In 1937, after brief periods with the Acme Fast Freight Company, and in the correspondence and sales departments of Brooks Bros., Inc., he joined the staff of Associated Business Papers as assistant to the advertising manager. In 1944 he was advanced to manager of research and promotion. During his connection with A. B. P., Mr. Kopfmann handled its publication and direct mail advertising; supervised its agency recommendation and credit activities; worked with the chairman of its speakers, merchandising and membership committees, and coordinated the activities of various club affiliated with the association.

Obituary

Howard E. Stoll, manager of railroad sales for the Bethlehem Steel Company from 1928 until his retirement in September, 1943, died on December 14.

Trade Publications

(To obtain copies of any of the publications mentioned in these columns, use postcards, page 85)

International Diesel Engines and Power Units—The Industrial Power Division, International Harvester Company, has issued a 24-page booklet, illustrated with photographs, drawings, charts, and tables, presenting the design features, work capacities, and specifications of International Diesel engines.

The Latch String Is Always Out—The Link-Belt Speeder Corporation has issued a 16-page booklet presenting a complete photographic trip through its modern shovel-crane plant at Cedar Rapids, Iowa. The booklet contains action photographs with descriptive captions of all the various offices and shops of the plant and concludes with views of the finished products in operation.

Dearborn De-Ionizing Systems — The Dearborn Chemical Company has published a 20-page illustrated booklet on de-ionizing systems for the production of mineral-free water. The booklet tells what the systems are and how they work, presents diagrams of 2-bed and 4-bed systems, discusses the theory of silica removal by ion exchange, offers data on design and operating costs, and gives typical specifications for de-ionizing equipment.

Snow Loader — The Barber-Greene Company has issued an illustrated, two-color, eight-page brochure describing the features and operations of the new Barber-Greene Model 522 snow loader, a self-propelled self-feeding machine, operated by one man.

Facts About Douglas Fir Plywood—This is the title of a 24-page booklet, illustrated with charts and tables, published by the Douglas Fir Plywood Association. The booklet presents, in question-and-answer form, data concerning the production, distribution and uses of Douglas Fir plywood.

American General-Purpose Hoist—The American Hoist & Derrick Co. has issued a four-page illustrated folder covering this company's line of general-purpose hoists with capacities ranging from 2,500 lb. to 10,000 lb. single-line pull. Particular emphasis is given in the pamphlet to the safety features of the compression-type dog used in all American hoists.

Tunneling for Profit and Convenience—This is the title of a four-page illustrated folder, issued by Armco Drainage & Metal Products, Inc., presenting the advantages and economies of tunneling with Armco tunnel liner plates in connection with the installation of sewers, utility lines, pedestrian and livestock underpasses, and other underground structures.

The R. C. Mahon Company — This company has published a 36-page 2-color booklet containing a picture story of the various activities of the company, its products and services, the scope of its operations and its capacity to serve industry and commerce.

Bulldozing for Profits—This is the title of a 12-page, 2-color booklet, published by the Caterpillar Tractor Company, describing its hydraulic and cable-operated bulldozers. Among the various applications described in the bulletin are heavy digging on stripping operations, backfilling drainage ditches, and land clearing and leveling. The pamphlet also contains numerous action pictures.

Air-Cooled Engines—The Wisconsin Motor Corporation has recently published an attractive, 60-page catalog describing its heavy-duty, air-cooled engines. The book contains numerous illustrations showing how the engines are made, together with descriptions and photographs of a variety of services in which these engines can be used. It also gives specifications for, and illustrations of, the various sizes and types of engines available.

Flintkote Industrial Products — This is the title of a 36-page brochure in which suggested specifications for the use of the products of the Flintkote Company, Industrial Products Division, New York, are listed. Included are specifications for asphalt mastic flooring, asphalt underlayment, protective coatings of several types and others. In each case the treatment includes a general discussion of the material and suggested specifications for its use.

 For additional information, use postcard, pages 85-86

ALPHABETICAL INDEX TO ADVERTISERS, JANUARY, 1949

 For additional information, use postcard, pages 85-86

A typical Blue Brute Track Team owned by the Detroit, Toledo & Ironton R. R., surfacing track north of Lima, Ohio

BLUE BRUTES SMOOTH UP THE LINE... BETTER AND FASTER... FOR THE D.T.&I.

Here's how Blue Brute Track Teams cut the time and cost of maintenance for one of the country's heaviest-hauling railroads.

The Detroit, Toledo & Ironton has found that the tough, power-packed Blue Brute Railroad Hand-I-Air Compressor . . . though easily transported by two men . . . delivers an *unfailing* supply of air for four WTT-7 Blue Brute Tie Tampers . . . 60 cubic feet per minute through its light, tight, easy-breathing Feather* Valves.

D. T. & I. men also know that the 42-lb. WTT-7's are easy on the operator and precision-balanced for smooth, trouble-free action . . . while improvements like the leak-proof throttle and anti-freeze design assure peak performance under all conditions.

Blue Brutes like these are doing faster, better surfacing for railroads all over the country — and cutting costs every foot of the way. Why not investigate how they — and their many other Blue Brute team-mates — can save time and money in your own maintenance work?

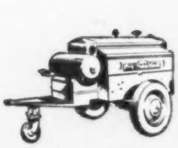
*Reg. U. S. Pat. Off.

H8-6

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts
Distributors in All Principal Cities

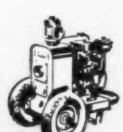
WORTHINGTON

BUY BLUE BRUTES

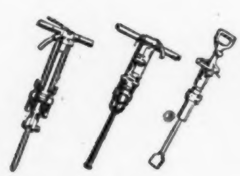


60' Portable Compressor

Portable Concrete Mixer



Self Priming Centrifugal Pump



Hand Held Air Tools.

Railcar Compressor

FOR EVERY CONSTRUCTION AND MAINTENANCE JOB

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